

**City of Seattle
Municipal Stormwater NPDES Permit**

2004 Annual Report

Providing an update on the status of stormwater program activities conducted during 2004 with updates, as appropriate, for 2005.

Submitted pursuant to Special Condition S10 of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for discharges from municipal separate sewers for the Cedar/Green Water Quality Management Area.

Municipal Stormwater NPDES Permit No. WASM 23003



Submitted by:
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September 1, 2005

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2004 Stormwater Management Program Update Report

1. INTRODUCTION

This report is submitted by the City of Seattle pursuant to Special Condition S10 of the National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge General Permit for discharges from municipal separate storm sewers for the Cedar/Green Water Quality Management Area. Seattle received coverage under the NPDES Municipal Discharge Permit from Washington State Department of Ecology (Ecology) in 1995. In 1997, Seattle's Stormwater Management Program (SWMP) was approved by Ecology as meeting the requirements of that permit. The report, highlighting various stormwater runoff management activities conducted by the City of Seattle, covers the 12-month period between January 1, 2004, and December 31, 2004, with updates as appropriate through mid-2005.

This report is divided into four sections.

1. Background: Stormwater and the City of Seattle. This section contains an overview of the nature of urban stormwater runoff and the challenges facing fully built environments like Seattle. It also provides an overview of the organizational responsibilities of key departments in the City involved in stormwater management and water quality.
2. Seattle's Stormwater Management Program Components. In this section, the various elements of Seattle's stormwater programs are summarized. Accomplishments during the reporting period are included and, for readers desiring additional information, a point of contact is provided for each program element.
3. Other Permit Reporting Requirements. The City's NPDES Municipal Stormwater Discharge Permit contains mandatory reporting elements that do not properly fit under one of the program headings in the previous section. These mandatory reporting elements are included in this section. Examples include fiscal analysis and changes in permit coverage area.
4. Next Steps. This section reflects on the challenges of stormwater management in the City of Seattle.

Two appendices are included at the end of this report:

- Appendix A provides a listing of current stormwater management programs and staff points of contact, and
- Appendix B cross-references the reporting requirements contained in the 1995 NPDES Municipal Stormwater Permit with the appropriate sections contained in this report.

Comments or questions regarding the overall organization or content of the report can be directed to Darla Inglis, Seattle Public Utilities Resource Planning Division, at 206-233-7160 or darla.inglis@seattle.gov

2. BACKGROUND: CITY OF SEATTLE AND STORMWATER

2.1 STORMWATER AND THE URBAN ENVIRONMENT

Urban stormwater runoff is the water that runs off surfaces such as rooftops, paved streets, highways, and parking lots. Runoff can also come from graveled areas and hard grassy surfaces like lawns and play fields. Urban stormwater runoff can be a problem for several reasons.

Flooding: In less urban areas, much of the rainfall is intercepted by trees and vegetation or infiltrated into the soil. In urban areas like Seattle, most of the rainfall remains on the surface where it can collect in low-lying areas and cause flooding.

Human Health: Untreated stormwater can contain toxic metals, organic compounds, and bacterial and viral pathogens. Untreated stormwater generally is not of drinking water quality and can lead to closures of swimming areas.

Aquatic Environment: In urban areas, our creeks, streams, and rivers can be harmed by urban stormwater. Because so little of the rainfall is intercepted or infiltrated, high volumes of runoff can arrive in these water bodies causing erosion and sedimentation. Stormwater can also adversely affect water quality by carrying the pollution from roadways, lawns, and business activities.

In Seattle, as it collects on roadways, lawns, gutters, and other impervious surfaces, stormwater can flow through a variety of natural and/or human-made systems. These include:

Natural Conveyance System: Naturally formed swales, ravines, and stream corridors such as Thornton Creek or Longfellow Creek are all examples of natural conveyance systems. Natural conveyance systems can cross privately and publicly owned property.

Ditch and Culvert System: This kind of system involves a combination of surface ditches and culverts usually located in the public right-of-way that convey stormwater to a natural drainage system or a public storm drain.

Public Storm Drain: This public drainage system is wholly or partially piped and is designed to carry only stormwater. Public storm drains convey stormwater to a natural drainage system or directly to receiving waters such as Lake Union or Lake Washington.

Public Combined Sewer: Seattle's Combined Sewer System conveys both stormwater and wastewater through a system of pipes to King County's treatment facility at West Point. The treated water is released into Puget Sound.

To meet the challenges of urban runoff, urban areas like Seattle must implement comprehensive stormwater management programs. These programs include capital projects to address both flooding and water quality concerns, maintenance activities to keep facilities functioning properly, and a range of programs designed to influence the actions of everyone who works or lives in the watershed. Many of these programs, primarily those related to the *quality* of the stormwater (as opposed to the *quantity* of stormwater), are described in this report.

2.2 SEATTLE DEPARTMENTS INVOLVED IN STORMWATER MANAGEMENT

Among the many departments serving Seattle, the four departments and one office described below are most involved in programs and projects relating to stormwater management and receiving water impacts.

Seattle Public Utilities

Seattle Public Utilities (SPU) was formed in 1997 during a municipal reorganization that placed the four rate-supported utility services of solid waste, drinking water, wastewater and drainage into one City department. Prior to the reorganization, Seattle Engineering Department's Drainage and Wastewater Utility (DWU) performed drainage planning. Today, SPU is the designated lead department for managing stormwater, including meeting stormwater regulatory requirements, conducting water quality programs, and managing drainage-related capital projects.

Department of Planning and Development

The Department of Planning and Development (DPD), formerly known as the Department of Design, Construction and Land Use (DCLU), is the City department responsible for developing, administering, and enforcing development standards. It is DPD that issues development permits as required under Seattle's Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 – 22.808) and inspects sites prior to and during construction. As part of the side sewer permit, inspections and complaints program transfer, DPD is currently doing the permitting and inspections. It was agreed that SPU would eventually manage customer complaints and inquiries (investigation and response) for non-permit work. Complaint handoff to DPD will occur when a Notice of Violation needs to be issued. All complaints and inquiries related to existing side sewer facilities would be directed to SPU Customer Service.

Seattle Department of Transportation

Seattle Department of Transportation (SDOT) is responsible for the City's streets and bridges, bike paths, street trees, and traffic operations. SDOT performs such roadway maintenance activities as street sweeping and snow and ice control. The Capital Projects Division of SDOT oversees all aspects of Transportation Capital Improvement Programs (CIPs) and coordinates development and implementation of large-scale city projects.

Office of Sustainability and the Environment

The Office of Sustainability & Environment (OSE) was created in the fall of 2000 to help put sustainability into practice, both within City government and in the community at-large. While OSE's primary focus is on "municipal sustainability" (more sustainable City operations, facilities, and services), this office also seeks to promote and increase "community sustainability" (more sustainable practices by businesses, other institutions, and individual households and citizens). One of OSE's missions is to provide leadership, tools, and information to help City government and other organizations use natural resources efficiently, prevent pollution, and improve the economic, environmental, and social well-being of current and future generations. Among the more recent endeavors has been a citywide effort to reduce pesticide use.

Seattle Parks and Recreation

Responsible for several hundred parks and park facilities, Seattle's Department of Parks and Recreation (SPR) is a key player in environmental stewardship. During 2001, SPR trained its

staff in comprehensive Best Management Practices for various maintenance activities, reduced pesticide use, worked to remove invasive plants and replant native species, and continued its partnership with Seattle Public Utilities on creek improvement projects.

3. STORMWATER MANAGEMENT PROGRAM COMPONENTS

In this report, Seattle's stormwater- and water quality-related programs are organized into twelve functional categories as shown in Figure 1. The categories are:

Comprehensive Stormwater Planning: Includes planning processes underway used to further develop and enhance Seattle's stormwater management programs.

Partnerships: Activities aimed at coordinating stormwater-related policies, programs, and projects among jurisdictions within a watershed, and among Seattle's departments sharing similar responsibilities.

Regulations and Technical Standards: Seattle's ordinances and SPU/DPD Directors' Rules are designed to control runoff from new development, redevelopment, and construction activities. Regulations also address source control and pollution prevention at existing commercial and residential areas.

Permitting, Inspections, and Enforcement: Programs that ensure proper application of and compliance with adopted regulations and standards.

Pollution Prevention: These programs are aimed at reducing or eliminating pollution before it can be picked up by stormwater runoff and conveyed to receiving waters.

Public Involvement, Education and Stewardship: In this category are the variety of programs whose purpose is to provide opportunities for individuals and groups to become involved in environmental and water quality activities, and learn how to be better stewards of our natural resources.

Illicit Discharge/Connection Reduction: An illicit discharge occurs when something other than stormwater is allowed to enter one of our conveyance systems. The programs listed under this category are hazardous spill response, illegal dumping, water quality complaint response, the business inspection program, and the drainage system inspection program.

Operations and Maintenance – Drainage System: These programs help Seattle maintain its public drainage infrastructure.

Operations and Maintenance – Roadways: In this category are described the programs operated by SDOT to reduce stormwater impacts from public streets.

Municipal Training: Training occurs throughout many of the programs within other programmatic categories. Under this category is listed a new training program specifically aimed at improving drainage system maintenance.

Information & Data Collection, Analysis & Management: This category includes many of the programs that collect and compile information needed to evaluate performance of programmatic activities and to assess the effectiveness of policies, standards, programs, and projects over time.

Capital Improvement Program: This category includes primarily SPU-sponsored capital projects involving facilities or other improvements that address stormwater impacts.

Additional details on these programs are provided in this report.

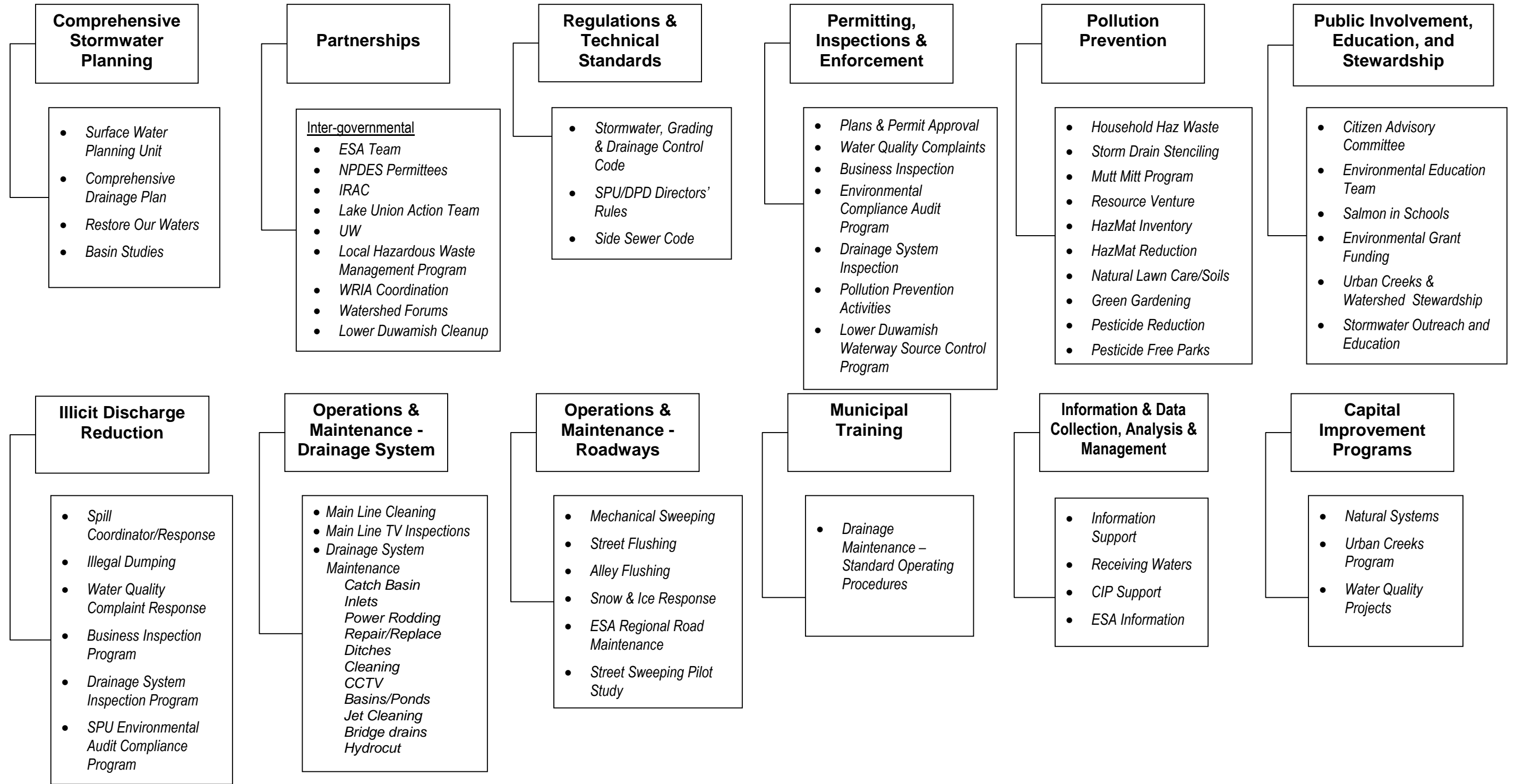


Figure 1. City of Seattle Stormwater Management Programs

3.1 COMPREHENSIVE STORMWATER PLANNING

SPU, as the lead stormwater management department for the City of Seattle, is involved in a number of planning endeavors designed to improve delivery of services and enhance environmental quality. Highlights of major planning efforts are provided below.

3.1.1 Surface Water Planning Unit

The primary duties of the Surface Water Planning Unit include policy, project and program specification per the Comprehensive Drainage Plan and managing the drainage capital fund. The Unit is organized under three core program areas: Protection of Beneficial Uses, Flooding Control and Local Drainage, and Public Asset Protection. Several milestones for 2005 include:

- Completion of the planning phase for the first integrated flooding control and water quality project at a basin scale in the South Park area of Seattle, and
- Completion of the first major Natural Drainage System, “Broadview Green Grid”, and beginning construction of the Pinehurst Green Grid and High Point projects.

Denise Andrews (206) 684-4601

3.1.2 Comprehensive Drainage Plan Update

SPU completed the update to their Comprehensive Drainage Plan (CDP) in 2004. The new CDP sets the direction for SPU’s Drainage Programs, including service levels, programs, projects and policies related to habitat and water quality work. The CDP includes:

- A vision for surface water management that includes Seattle creeks, shoreline, and lakes as well as traditional drainage infrastructure;
- A fully developed Natural System Program that optimizes water quality and quantity management and mobility goals in the right-of-way;
- Recommendations for an expanded water quality program with increased monitoring and pollution prevention activities;
- Recommendations for flow control to creek watersheds to reduce stormwater runoff impacts; and
- A robust 6-year candidate drainage CIP with recommendations for operational and enforcement programs many of which are directed toward the benefit of Seattle’s aquatic resources.

Within the CDP, the level of drainage service is expected to include:

- Public safety as it relates to drainage;
- Protection and, where feasible, enhancement of water quality and habitat for key aquatic resources;
- Compliance with regulatory requirements; and
- Operation and management of public investment in the drainage infrastructure.

These services are expected to be applied in a manner that reflects geographic differences within the city and the corresponding service needs. Links with other City Departments and the

services they provide will be created in order to optimize benefits to ratepayers.

The Comprehensive Drainage Plan is currently available at:

http://www.seattle.gov/util/About_SPU/Drainage_&_Sewer_System/Plans/Comprehensive_Drainage_Plan/index.asp

Darla Inglis (206) 233-7160

3.1.3 Restore Our Waters Strategy

In April 2004 the Mayor issued Executive Order 03-04 requiring inter-departmental review of everything the City does that affects water resources inside the City limits. In September of 2004 the Mayor issued the Restore Our Waters strategy, an outcome of the inter-department review, which offers a coordinated, wide-ranging, and science based strategy to improve all of Seattle's water resources. Supported by a City Restore Our Waters Team and guided by a Community Stakeholders Group comprised of concerned citizens and representatives from the scientific, environmental, and business communities, the City is making policy decisions that focus City resources on the long-term improvement of the aquatic ecosystem.

The objectives of the Restore Our Waters strategy are to:

- Use Science-Based Guidelines to Direct Citywide Efforts;
- Make Strategic Changes to the City's Policy and Regulatory Framework;
- Move Forward on 40 Priority City Capital Projects;
- Make Investments to Ensure City Operations Support Improved Aquatic Health;
- Expand Partnerships with the Community and Private Property Owners to Restore Our Waters;
- Advance Scientific Understanding and Adaptively Manage City Efforts;
- Establish Clear, Quantifiable Goals and Measures of Progress; and
- Establish a Stakeholder Group to Promote Long-Term Coordination within City Government and between the Citizens of Seattle.

Since the Restore Our Waters strategy was issued by the Mayor, the City has accomplished the following objectives in support of the Restore Our Waters strategy:

- Guided by the Cross Utility Science Team, SPU has begun development of a "Desired Future Conditions" document that will establish quantifiable goals and benchmarks to restore each of the City's water resource areas;
- Established a Citywide ROW Team to begin the work of coordinating activities across all City Departments;
- Established a Community Stakeholders Group to provide input on City policy related to water resources;
- Launched a pilot project to improve Stormwater Code compliance at City facilities; and
- Began process to evaluate a rate credit and incentive program for drainage customers who invest in on-site stormwater detention, infiltration, and water quality facilities.

Information about the Restore Our Waters strategy is available at:

<http://www.ci.seattle.wa.us/mayor/issues/row.htm>

John Taylor (206) 733-9183

3.1.4 Basin Studies

Norfolk Drainage Basin

The MLK Way/Norfolk CIP project is in the preliminary engineering phase and will integrate drainage and water quality improvements. The drainage element will reduce storm drain overflows to the existing sanitary sewer pump station. Three drainage options are being considered: improve 950 ft of existing conveyance ditch, install new 60-inch outfall to existing conveyance ditch, and install new culvert under I-5 and improve 430 ft of existing conveyance ditch. The water quality element will reduce pollutant loading to the Duwamish Waterway. Three alternatives are being considered: new shallow wet pond on the City-owned property west of I-5, new deep wet pond on the City-owned property west of I-5, and new shallow wet pond on City and additional property west of I-5.

In preparation for the construction phase, sections of pipe in the MLK Way system were cleaned to restore the hydraulic capacity and, in addition, remove and dispose of sediment. The pipe section was video-inspected following cleaning to document post-cleaning conditions.

Gary Schimek (206) 615-0519, Beth Schmoyer (206) 386-1199

South Park Drainage Basin

The 4th Avenue and Trenton CIP project is in the preliminary engineering phase and will integrate both flooding and water quality improvements. The drainage element would install up to 1,760 feet of 12-inch storm drain for the Trenton Street segment and up to 2,380 feet of 12-inch storm drain for the Director Street segment. The new storm drain would then outfall at South Henderson Street into the existing storm drain system that discharges to the Duwamish Waterway at 7th Ave S. This network would solve the majority of flooding problems associated with drainage management in the right-of-way, which currently causes both private and public flooding problems. Benefits to private property owners would be primarily correction of drainage problems that occur at frontage grade. A new stormwater pump station will also be constructed due to tidal impacts on flooding.

South Park Water Quality Project. The water quality portion of the project is evaluating four options to reduce the pollutant loading to the Duwamish Waterway from the 7th Ave S storm drain system. In 2004, an evaluation of possible stormwater treatment technologies was completed. In 2005, SPU collected samples from select locations in the drainage system to characterize the quality of sediment discharged from this basin and developed options for incorporating stormwater quality improvements into the overall drainage plan for this area. The following options will be investigated during preliminary engineering: end-of-pipe treatment, end-of-pipe treatment with diversion, and divert lower 7th Ave S subbasin to the combined sewer with separation of an equivalent area elsewhere.

Gary Schimek (206) 615-0519, Beth Schmoyer (206) 386-1199

Densmore Drainage Basin

The 125th & Aurora Avenue CIP Project is in the preliminary engineering phase and will install a new drainage system along Aurora Avenue between 110th Avenue and 137th Avenue. A water quality element will be included in the project and will be sized, at minimum, to meet the requirements of the City's Stormwater Code. This CIP project is a joint effort between the Seattle Public Utilities and Seattle Department of Transportation.

The Lower Densmore CIP project is in the development phase and will create a long-term strategic implementation plan for drainage and water quality projects within the Lower Densmore basin. The implementation plan will be guided by the goals, strategies, and policies from the 2005 Comprehensive Drainage Plan and include detailed descriptions, cost estimates, and recommended phasing of candidate projects. This project will build upon the results of the hydraulic study and water quality analysis.

The water quality analysis is focusing on evaluating potential water quality impacts to Green Lake from proposed drainage system improvements and identifying opportunities to incorporate stormwater treatment into both the trunkline and local drainage systems. In 2005, a consultant completed the Green Lake water balance analysis. The consultant started modeling phosphorus loading to Green Lake for several drainage scenarios and developing mitigation recommendations as appropriate.

Gary Schimek (206) 615-0519, Ingrid Wertz (206) 386-0015

Thornton Creek Drainage Basin

During 2004 and the first half of 2005, the following projects in the Thornton Creek Basin were in the CIP process:

1. The Thornton Creek Water Quality Channel project will use natural drainage system technology to provide water quality treatment in a highly urbanized area of the South Branch of Thornton Creek. Located at the headwaters of the South Branch of Thornton Creek, this site offers the last available opportunity to provide water quality treatment to this 670-acre drainage basin before stormwater reaches the creek. The project design diverts stormwater from the drainage pipe under NE 100th Street to a series of surface swales landscaped with amended soil and native plants to help clean, infiltrate and slow the stormwater before it reaches the creek. The channel will have water flowing in dry weather, as well as cleanse stormwater from the frequent storms. The existing storm drainpipe will stay in place to carry high storm flows when the channel cannot handle all the stormwater volume. The project design and construction will be coordinated with a new mixed-use development adjacent to the site and provide 2.7 acres of valuable open space for the Northgate community. SPU has purchased the property. SPU is beginning permitting discussions and plans to begin negotiating an agreement with DOE regarding a loan award for the construction budget.
2. The Pinehurst Green Grid project (located upstream of Kramer Creek) is in the construction phase and will be completed in the spring of 2006. Pinehurst is a natural drainage system project that will improve water quality and reduce flows through infiltration.
3. The 30th Ave NE project is in the preliminary engineering phase and will reduce flooding along 30th Avenue Northeast between Northeast 107th and 110th streets. As part of the preliminary engineering phase, flow rates along Kramer Creek (tributary to South

Branch of Thornton Creek) were monitored and the project model (as opposed to the basinwide model) was calibrated. Alternatives to reduce flooding will be examined in conjunction with a proposed Natural Drainage System project along 110th Street.

4. The Jackson Park Detention Phase 2 project is in the closeout phase; as such plant establishment and monitoring continues near the completed three detention ponds and restored creek channel at Jackson Park Golf Course.
5. During 2003, SPU modified a culver under Lake City Way and built a fish ladder to improve fish passage. For the first time in over fifty years, coho and sea-run cutthroat trout have been able to access an additional 2,000-ft of stream. During Summer 2004, SPU made some minor adjustments to ensure the functioning of this fish ladder.
6. The Meadowbrook Outfall Rehabilitation project is in the preliminary engineering phase and will repair the three outfalls that are located downstream of the flow control structure. The preferred design alternative, project schedule, and permit requirements will be developed as part of the preliminary engineering process.
7. SPU continued the second phase of restoration and completed enhancement plans for Thornton Creek Park 6, a 6.5-acre natural area near the headwaters of the south branch. During the summers of 2003 and 2004, SPU added large woody debris and boulders to a 350-ft reach and 200-ft of creek. The restoration work also included the addition of native vegetation along the creek.
8. SPU partnered in the restoration of a small section of creek flowing through Little Brook Park. Much of Little Brook flows through pipes and unimproved channels behind apartment buildings. This project helps create community pride and offer a visual reminder that urban creeks can be beautiful places that support wildlife.

Gary Schimek (206) 615-0519

3.1.5 Public Participation in Planning Processes

(See 3.6.1, Creeks, Drainage, and Wastewater Citizen Advisory Committee)

3.2 PARTNERSHIPS

Managing stormwater, reducing pollution, and improving the conditions of our receiving waters involves the combined efforts of many City of Seattle departments as well as partnerships with other jurisdictions. Most of these collaborative efforts are described elsewhere in this report.

3.2.1 Intergovernmental Coordination

Below are some selected examples of how the City of Seattle is involved in partnerships with other jurisdictions sharing responsibilities within our watersheds.

ESA Team

In May 1999, the National Marine Fisheries Service (NMFS) listed the Puget Sound Chinook salmon (*Oncorhynchus tshawytscha*) as *threatened* under the Endangered Species Act (ESA) and in December 1999 the US Fish and Wildlife Service (USFWS) added the coastal bull trout (*Salvelinus confluentus*) to the threatened list. In 2001, the federal case Alsea Valley Alliance versus Evans resulted in NOAA fisheries reassessing salmon population risk analyses that were the foundation of its regulatory rules on the West Coast to protect threatened or endangered salmon population. In 2004, as a result of the new risk analyses, NOAA fisheries issued new policies and rules related to hatchery management, critical habitat designation, and

listings of threatened or endangered salmon populations. In 2004, USFWS proposed critical habitat designations for Bull Trout as a threatened species. Since the original listing in 1999, Seattle's response has included the formation of an interdepartmental, citywide ESA Team. The ESA team focuses on five primary issues: (1) negotiations with NOAA Fisheries and United States Fish and Wildlife Service (USFWS), (2) regional coordination with Shared Strategy and Tri-County, (3) supporting regional watershed action planning, especially in WRIAs 3 & 4, 7, 8, and 9, (4) developing salmon research and habitat investments designed to protect and restore Seattle's major aquatic environments, and (5) departmental implementation of best management practices and appropriate mitigation of capital projects. In addition, SPU's capital projects now undergo Triple Bottom Line (TBL) analysis in a much more rigorous form than in past years. TBL analysis requires assessment of the financial, social, and environmental benefits and costs of a project. The ESA Team includes a policy representative from each department who has access to the Director of his/her Department, including SPU, City Light, SDOT, Parks, and the Department of Planning and Development. Chuck Clarke, Director of SPU, is the executive sponsor with responsibility for interdepartmental efforts and reports to the Mayor's Office.

Martin Baker (206) 684-5984

Coordination among NPDES Municipal Stormwater Permittees

The City of Seattle is a regular participant in the NPDES Municipal Stormwater Permittee Interagency Working Group, an ad hoc collective whose members represent all the current NPDES stormwater-permitted jurisdictions in the State of Washington, as well as the Port of Seattle, Port of Tacoma, and the Washington State Department of Ecology. The group met several times in 2005 to discuss issues related to stormwater management and the upcoming Stormwater NPDES permit. The group will begin meeting on a regular basis when the draft Phase I Stormwater NPDES permit is made available by Ecology.

Darla Inglis (206) 233-7160

Interagency Resource for Achieving Cooperation

Seattle Public Utilities regularly participates in the Interagency Resource for Achieving Cooperation (IRAC) program. IRAC began in mid-1993 as a forum for state and local regulatory agencies to share their diverse regulatory perspectives. IRAC's mission is to provide the forum and structure for governmental agencies to coordinate regulations that protect human health, safety and the environment. A primary goal of IRAC is to bring agencies together to address gaps, overlaps, and inconsistencies relating to regulatory issues. One representative of SPU is presently serving on the IRAC Advisory Committee. SPU is also actively involved in the IRAC Troublesome Sites Workgroup.

Ellen Stewart (206) 615-0023

Lake Union Action Team

The Lake Union Action Team (LUAT) was formed in 1988 as part of Ecology's Urban Bay Action Program. The goals of the Urban Bay Action Program include protecting ecosystems from further degradation, restoring damaged areas, and protecting the beneficial uses of the water body. The LUAT is a multi-agency body that supports the goals of the Urban Bay Action Program by coordinating regulatory and source control efforts in the Lake Union drainage basins. Local, state and federal regulators involved with the Lake Union watershed meet on a bimonthly basis. Members include representatives from Seattle Parks and Recreation, Seattle

Department of Design, Construction and Land Use, King County Industrial Waste Program, King County Hazardous Waste Program, King County Wastewater Treatment Division, Port of Seattle, Washington State Department of Ecology, Washington State Department of Natural Resources, Washington State Department of Fish and Wildlife, Washington State Department of Transportation, US Environmental Protection Agency, and the US Army Corps of Engineers.

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University of Washington Center for Water and Watershed Studies

Seattle Public Utilities is a participant on the Advisory Panel for the Center for Water and Watershed Studies (CWWS). SPU continues to provide support to CWWS related to surface water runoff issues. The mission of the group is to conduct research, education, and information transfer about regional watershed studies encompassing diverse aquatic and human environments. The CWWS is a source of comprehensive aquatic resources and water management information to maintain and enhance the earth's watersheds. The research of the Center provides models for addressing both regional and global watershed issues, bringing together science and policy studies for publication and for discussion in courses, seminars, and workshops. CWWS is a broad, collaborative community of environmental scholars, achieving its goals through research, education, and information transfer.

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Local Hazardous Waste Management Program

SPU participates as one of five partners in implementing the regional Local Hazardous Waste Management Program (LHWMP) in King County, in existence since 1991. This interagency partnership oversees the management of a long-term plan to reduce the use of and manage disposal of hazardous waste and consists of SPU, the Water and Land Resources and Solid Waste divisions of King County's Department of Natural Resources, the Public Health Department of Seattle and King County, and the Suburban Cities Association. SPU provides staffing to coordinate Household Hazardous Waste (HHW) education and collection programs as part of the LHWMP, to represent SPU on interagency committees and workgroups, and to help develop strategic policy, planning and budget proposals in support of SPU and LHWMP goals. Results for 2004 and the first half of 2005 include:

- Management Coordinating Committee (MCC) approved continued LHWMP funding for Environmental Justice Network in Action (EJNA) and integration with other LHWMP programs;
- MCC approved continuation of Green Gardening and Natural Yardcare programs, while cutting other HHW education programs in the county;
- Worked with Natural Yardcare Neighborhood program for implementation of workshop series in Thornton (2004), Piper's and Longfellow creek watersheds (2005); and
- Initiated idea and identified leveraged resources to produce new HHW disposal flyer for residents of Seattle and King County, modeled after SPU's photo recycle education flyer.

Kathy Minsch (206) 615-1441

Watershed Resource Inventory Area (WRIA) Coordination

The City of Seattle continues to be actively involved in Watershed Resource Inventory Area (WRIA) planning. The jurisdiction of the city of Seattle is contained in WRIA 8 (Cedar/Lake Washington) and WRIA 9 (Green/Duwamish). Owing to municipal operations in other areas outside the city's limits, Seattle is also active in WRIA 7 (Tolt/Snohomish), WRIs 3 & 4 (Lower & Upper Skagit), and WRIA 62 (Pend Orielle). SPU has two senior-level WRIA coordinators (WRIA 8 & 9), and Seattle City Light has allocated staff to WRIs 3/4, 7 and 62. WRIA planning efforts work to build inter-jurisdictional coalitions and partnerships that integrate citywide efforts within each WRIA. The WRIA planning bodies have focused planning agendas on developing baseline salmon habitat assessments and recovery plans, which have included identifying watershed-wide informational needs and limiting factors to salmon recovery. In February 2002, WRIA 8 produced a Draft Near-Term Action Agenda for Salmon Habitat Conservation, and in May 2002, WRIA 9 issued its final Near-Term Action Agenda for Salmon Habitat Conservation. WRIA 7 produced a Near-Term Action Agenda in December 2001. These documents are the product of over a year of collaborative discussions among elected officials, jurisdictional staff, business and environmental groups, scientists, and concerned citizens. They were intended to provide guidance to local governments and interested organizations and citizens on interim measures that can be undertaken in the near-term while longer-term conservation plans were being developed.

WRIs 7, 8 and 9 have now completed their strategic assessments and their recovery plans. WRIA 8 used an ecosystem model, Ecosystem Diagnosis and Treatment (EDT), to assess historic and current habitat conditions in the Lake Washington basin. Modeling results were used in conjunction with Chinook salmon distribution and an analysis of current land use patterns in the basin to develop a set of recommendations for site specific habitat protection and restoration projects. In 2006, WRIA 8 will continue using EDT to evaluate the relative benefits of different suites of actions for recovery of Chinook runs. WRIA 9 has completed assessing both current and historic habitat conditions to provide insight for developing their salmon recovery projects. Close coordination with the Puget Sound Nearshore Ecosystem Restoration Project has allowed the WRIA to place emphasis on marine nearshore habitats, in addition to the freshwater ecosystem. WRIA 3/4 revised its strategic plan for prioritizing recovery projects to emphasize ESA listed species: chinook salmon and bull trout. Recovery efforts in the Skagit watershed are currently focusing on estuary and nearshore areas, with a number of cooperative scientific studies identifying the importance of these areas to chinook salmon and bull trout. WRIA 3/4 completed an analysis of long-term restoration approaches for salmon habitat in the Skagit delta and estuary. WRIA 7 developed an Ecological Analysis for Salmonid Conservation (EASC) as a collaborative effort between its technical committee and the Puget Sound Technical Recovery Team for Chinook salmon. The EASC employed EDT and a separate model called Shiraz to categorize sub-basins for their importance to habitat and devise individual protection and recovery strategies.

WRIA 8 developed a comprehensive habitat plan for the Lake Washington basin, including recommended site-specific habitat protection and restoration projects, land use actions and public outreach/stewardship initiatives. A draft plan underwent review and refinement by the WRIA 8 planning bodies. Public review of the document began in November 2004, and a final plan was available in May 2005. WRIA 9 developed recovery actions during 2004 and completed its habitat plan in mid-2005. WRIA 7 approved its Draft Snohomish River Basin Salmon Conservation Plan in July 2004, triggering a public and agency review period with final plan approval in June 2005.

Additional information for WRIAs 8 and 9 can be found at:

<http://dnr.metrokc.gov/WRIAS>

Additional information for WRIA 7 can be found at:

<http://www.co.snohomish.wa.us/publicwk/swm/salmon/snohoplan/index.htm>

Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078; Scott Powell, WRIA 7 (206) 386-4582; Ed Connor, WRIAs 3&4 (206) 615-1128

Watershed Forums

Seattle's elected officials and staff have participated in local Watershed Forums since their inception several years ago. These Forums were initially formed as an outgrowth of the Regional Needs Assessment for surface water management and were originally tasked to address surface water management needs, including flooding and water quality. The Forums were later expanded to also address salmon and related habitat issues, and in 2001 they were formally aligned with the WRIA planning processes. The purpose of these Forums is to:

- Provide an opportunity for all local governments that share the watershed to discuss salmon habitat and water quality issues;
- Provide overall direction for joint efforts to recover salmon habitat;
- Allocate King Conservation District funds to salmon habitat projects and activities important to the entire WRIA; and
- Provide oversight for the jointly funded staff working on salmon habitat planning.

The boundaries of Seattle lie within the Lake Washington/Cedar/Sammamish Forum (WRIA 8) and the Green/Duwamish and Central Puget Sound Watershed Forum (WRIA 9). [Note that in 2001, the Central Puget Sound Subforum was incorporated into the Green/Duwamish Forum.] Interlocal agreements have been signed through which all jurisdictions are financially supporting the WRIA planning process. King Conservation District funds, allocated through the Forums, support projects for salmon recovery, in some cases supplying the local match for Salmon Recover Funding (SRF) Board grants.

Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078

Lower Duwamish River Sediment Cleanup and Restoration

The City is continuing to participate in a Remedial Investigation of the Lower Duwamish in partnership with King County, the Port of Seattle, and Boeing. This work is being done under an Administrative Order on Consent (AOC) from EPA and Ecology under the Federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) and the Washington State Model Toxics Control Act (MTCA). Phase I of the Remedial Investigation (RI) has been completed, resulting in the identification of eight candidate sites for early cleanup action. SPU is also a member of the multi-jurisdictional Elliott Bay/Duwamish Restoration Panel (EBDRP), which was created as a result of a consent order settling Natural Resource Damages claims. EBDRP includes representatives from NOAA, US Fish and Wildlife Service (USFWS), the Muckleshoot and Suquamish tribes, the Department of Ecology, King County and the City of Seattle. It prioritizes and funds clean up and restoration projects on the Duwamish River using City and County funds contributed as part of the settlement. It has funded a clean-up project at the Norfolk site and at the Diagonal/Duwamish

site. Habitat projects include habitat restoration at the Seaboard Lumber site and other locations.

Martin Baker (206) 684-5984

3.3 REGULATIONS & TECHNICAL STANDARDS

3.3.1 Stormwater, Grading and Drainage Control Code and Directors' Rules

In July 2000, the City revised its Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 - 22.808) and associated Director's Rules for Flow Control, Stormwater Treatment, Source Control, and Construction Stormwater Management. Now fully in effect, the Code and Directors' Rules can be viewed on the City's Website:

<http://www.ci.seattle.wa.us/dclu/Codes/sgdccode.htm>

Beginning in early 2002, Seattle Public Utilities (SPU), working in close collaboration with the Department of Planning and Development (DPD) and other City Departments, began identifying where changes in the City's 2000 Stormwater Code should be considered after Ecology issued its *Stormwater Management Manual for Western Washington* (2001). The project has been adjusted to account for Ecology's revised *Stormwater Management Manual for Western Washington* (February 2005). Additionally, the scope of the effort has been expanded to incorporate non-structural preventive actions and source reduction approaches, such as low impact development methods to minimize creating impervious surfaces and disturbing soils and vegetation. The goal of the Stormwater Code Revision Project is to develop a revised set of technical standards and code requirements that accounts for Seattle's built-out environment and development patterns while, at the same time, retaining equivalency with Ecology's guidelines.

Robert Chandler (206) 386-4576

3.3.2 Side Sewer Code

Seattle Municipal Code 21.16, the Side Sewer Code, prohibits certain discharges into the City's public sewer system, drain, ditch, or natural outlet. Included in the list of prohibited discharges are: fats, oils, grease, high temperature liquids, flammables and oils, toxic and poisonous substances, garbage, sand, and mud.

In addition to revising the Stormwater Code, SPU is currently leading an interdepartmental initiative to revise the Side Sewer Code. The new code is needed both to meet the requirements of the NPDES permit, and to better align with City goals for improved infrastructure, public health and water quality. A team of SPU and DPD side sewer experts has been formed to work on the side sewer code revision.

Gary Schimek (206) 615-0519

3.4 PERMITTING, INSPECTIONS & ENFORCEMENT

3.4.1 Drainage Plans and Permit Approval

Development permits are issued by the City of Seattle's Department of Planning and Development (DPD), formally known as the Department of Design, Construction and Land Use

(DCLU). In 1999 the Department, then known as DCLU, conducted an internal reorganization, combining the teams that conducted Drainage and Environmentally Critical Area project review with teams that conducted on-site inspections. This reorganized group within DPD was called the Site Development (SD) team. The intent was to bring all the necessary skills associated with site development into one team to perform comprehensive project review and inspection.

In 2000, the Department initiated a new program that required Pre-application Site Visit (PASV) inspections for all proposed construction projects (prior to an applicant's submittal of development plans) where the existing ground condition or vegetation will be disturbed. These PASVs are generally done within 48 hours of DPD receiving a PASV and Addressing Application. These site visits are designed to verify actual on-site conditions, including: topography, soils, environmental impacts, specific concerns, and the types of special reports needed (topographic survey, wetlands, etc). The SD team also assists land use and code enforcement staff with site issues, and provides site review for building and grading permit applications, short plats, Master Use Permits, complaints and violations.

During the period of mid 2004, ten SD team staff, including site inspectors, attended a two-day Department of Ecology Temporary Erosion and Sediment Control (TESC) certification class. The SD team also provided, on numerous occasions in 2004/2005, three-hour DPD TESC workshop for developers, consultants and contractors who are doing development projects located within the City. SD staff also developed a sample TESC plan and details that can be used for smaller projects. The plan is included with all projects that do not contain both Best Management Practices details and a plan delineating the location of the selected BMPs. In 2005, DPD also initiated a temporary dewatering permit for construction sites that requires the removal of collected surface and subsurface water from the site.

DPD's SD team currently consists of 20 staff members: a supervisor, a senior civil engineer, an associate civil engineer, three senior civil engineering specialists, eight site inspectors, three geotechnical engineers, and an environmental biologist. A special concern of the SD team is site construction activity that occurs within Environmentally Critical Areas (ECAs), shorelines and within the drainage basins of the City's five major creeks. The Drainage and Sewer Desk of DPD is staffed by SD senior civil engineering specialists to provide technical advice and review on grading, side sewer and drainage components of construction projects. DPD Site Development Office Inspectors complete approximately 25 TESC inspections daily and approximately 6500 inspections annually. These inspections include first ground disturbance inspections to ensure TESC measures are in place before excavation begins, side sewer construction (including service drains) inspections, and final inspections.

Ken Watanabe (206) 233-7912

3.4.2 Water Quality Complaints

SPU surface water quality inspectors respond to water quality-related complaints within the City limits. The complaints originate from citizens who call the City's hotline (684-7587), staff reports, and referrals from other departments and agencies. When an Inspector responds to a complaint, the Inspector attempts to stop the polluting action (if it is on-going), determines the source and responsible party, and provides technical assistance. Inspectors provide technical assistance on best management practices for pollution prevention and education on relevant Seattle codes. All complainants, if requested, are notified of investigation results. SPU water quality inspectors received 350 surface water quality complaints in 2004 and 198 between January 1 and June 30, 2005. A summary of the water quality complaints received during 2004

are provided in Table 1.

Table 1. Summary of Water Quality Complaints

Type of Material	Number of Complaints	Percentage of Total
Automotive Fluid	39	10%
Sewage	16	5%
Soap	14	4%
Miscellaneous	56	16%
Chemicals	11	3%
Construction	29	8%
Debris	8	2%
Grease	9	3%
Oil	86	25%
Paint	25	7%
Other	60	17%

Cases are classified as unresolved or resolved. In 2004, 285 cases were resolved while 64 cases remained unresolved. A case is considered resolved if education and technical assistance are provided to the alleged violator(s) and/or the case is referred to an appropriate department or agency. The case is considered unresolved if the problem cannot be found or confirmed by SPU inspectors or if the original source cannot be identified. There is currently about 1 FTE assigned to this program.

Ellen Stewart (206) 615-0023

3.4.3 Business Inspection Program

The goal of the Business Inspection Program is to reduce and/or prevent stormwater pollution by inspecting businesses and requiring that they implement best management practices in accordance with the City's Stormwater, Grading and Drainage Control Code when necessary. All businesses are required to maintain onsite drainage control systems and identify and remove illicit connections to the public storm drain system. Inspectors use a list of HRPGA (high-risk pollution generating activities) to determine business site activities that require additional operational source control requirements. All businesses that engage in one or more HRPGA's are required to implement applicable operational source controls and implement spill prevention plans. In 2004, inspections were conducted in the Thornton and Lower Duwamish (Superfund) drainage basins. There were a total of 326 full onsite inspections, most of which required corrective actions. The most common problems found during business inspections included catch basins full of sediment and incomplete and/or missing spill prevention plans and spill kits. The number of businesses requiring corrective actions in 2004 is presented in Table 2.

Table 2. Corrective Actions Required

Corrective Action	# Businesses
Clean and eliminate leaks and spills from storage areas	6
Correct illegal plumbing connection	6
Discontinue discharging washwater or process wastewater to storm drain	21
Implement proper housekeeping activities	15
Implement proper washing practices	15
Improve or create spill response procedures	149
Improve or purchase adequate spill response materials	136
Make storm drain facility parts accessible	3
Replace/repair missing or damaged components of storm drain facility	47
Properly educate employees	139
Properly perform vehicle and equipment maintenance	8
Properly store containerized materials	14
Properly store non-containerized materials	7
Clean storm drain facility	153

In addition, there were 70 screening inspections done. A screening inspection indicates that an Inspector spoke with a manager or owner, but determined that there were no high risk pollution generating activities occurring onsite. For the period January - June 30, 2005, 139 full business inspections and 14 screening inspections were conducted. The inspection areas included the Thornton and Duwamish basins. Approximately 7 illicit connections were identified and corrected during 2004. There are currently about 3 FTEs assigned to business inspections. An additional inspector was hired in 2004 to help with Lower Duwamish Superfund inspections.

Ellen Stewart (206) 615-0023

3.4.4 SPU Environmental Compliance Audit Programs

Since 2000, SPU has conducted Environmental Compliance Audits at 14 facilities on a 2-year cycle. Each facility will have been audited three times by the end of 2006. The Audit Team uses a set of audit protocols covering eight major regulatory areas (e.g., Resource Conservation and Recovery Act (RCRA), Superfund Amendment Reauthorization Act (SARA) Title III, Clean Air Act, Clean Water Act, etc.) as well as certain safety regulations and the Uniform Fire Code that overlap significantly with hazardous materials or hazardous waste areas of concern. Audits include inspections of outdoor storage areas, examination of oil/water separators and storm water inlets, and assessment of facility spill prevention and response plans.

John Labadie (206) 684-8311

3.4.5 Drainage System Inspection Program

In 2004, 271 drainage system inspections were completed, and 54 inspections have been completed during the first six months of 2005. Inspections focus primarily on multi-family dwellings, commercial, and industrial properties. The total number of privately owned systems in Seattle is estimated to be 3,250 (+/- 200). A summary of the types and frequency of problems found in 2004 is presented in Table 3.

Table 3. Drainage System Problems

Problem	# Times
Orifice plate is plugged	6
Detention system sump or pipe has excessive sediment accumulation	19
Maintenance hole or flow control device has structural defects	3
Catch basin(s) has excessive sediment accumulation	50
Missing or damaged components to flow control system need replacement/repair	16
Cannot access the flow control maintenance hole (buried, stuck, inaccessible)	15
Missing or damaged components to flow control system need replacement/repair	19
Detention system has excessive amount of contaminants present	4
Detention system has illicit connection	2
Catch basin has illicit connection	1
Miscellaneous	8

Of the 271 sites inspected in 2004, approximately 113 were in need of some level of maintenance or repair. Technical assistance is provided to property owners when they are informed of maintenance deficiencies. Removal of sediment from flow control structures and/or onsite catch basins was the most common maintenance need. Other common compliance issues include catch basins missing outlet traps, and missing, broken, or plugged flow control devices. Through the Drainage System Inspection Program, two illicit connections were identified and corrected in 2004.

Ellen Stewart (206) 615-0023, Louise Kulzer (206) 733-9162

3.4.6 Pollution Prevention Activities

Piper's Creek Watershed: In 2004, SPU essentially completed a source control education and investigation effort in the Piper's Creek watershed. The purpose of the effort was to determine the source of sewage odors and petroleum odors in the Piper's Creek ravine, to educate area businesses about pollution control practices, and to check for potential illicit connections and seepages in the Carkeek Park area.

Investigations revealed the source of odors to be vents in a large wastewater pipe traversing the site. King County was contacted and asked to provide odor control for these vents. They did provide activated carbon inserts, but the odor control was not effective. The City has asked that more aggressive odor control be provided.

Out of 333 potential businesses in the watershed, only about 200 were actual businesses (the others turned out to be residences), and most of the 200 businesses did not have any high-risk pollution-generating activities. Only eight businesses received follow-up visits about pollution reduction measures.

The investigation also did screening level chemical analysis of seeps and storm drains into the Piper's Creek watershed. No source of pollution, including fecal coliform bacteria, was detected in seepages. This is also true for the few portions of the drainage system that had enough water to sample. The exception, however, was a small pond discharging into the storm drainage system that had elevated fecal coliform levels. This pond was used by ducks.

Spill Kit Incentive Pilot Program(SKIPP): In 2004, the Surface Water Quality team embarked on an incentive program to reduce the risk of pollutants entering Seattle's surface waters. The approach will make it easier for businesses to comply with little-known code requirements for businesses engaged in "high-risk pollution-generating activities" to have a spill control plan and spill kit on their premises. The SKIPP program is largely carried out by Resource Venture and the Environmental Coalition of South Seattle (ECOSS). Through letters, inspections, workshops and door-to-door outreach, about 200 kits have been placed in businesses that would not have made this provision until their inspection rotation came due, a cycle of eight to ten years given current staffing levels. The program is structured so that the business can fill out a request on-line. Once they complete a simple spill plan form and submit it, they are contacted by ECOSS staff. Staff then correct any problems with their spill plans, laminate the plan, and deliver the laminated plan and a spill kit to the businesses. The delivery involves brief training about how to use the kit and the importance of cleaning up any spills. The goal of the program is to place 500 kits in the hands of businesses.

A special effort has been made to reach out to communities whose first language is not English. ECOSS has a multi-cultural team of workers on contract. These individuals as well as a youth group in the International District went door to door to ethnic businesses to distribute the kits and to get spill plans made for the business. These programs were both effective, and almost 25% of all SKIPP participants are ethnic businesses.

Louise Kulzer (206) 733-9162

3.4.7 Lower Duwamish Waterway Source Control Program

Source control activities to support the Lower Duwamish Waterway (LDW) Superfund remedial investigation/feasibility study continued during this reporting period. The Lower Duwamish Waterway (LDW) was listed as a federal Superfund site in 2001 because of contaminated waterway sediments. The purpose of the source control program, which includes business inspections and pollutant source tracing, is to minimize the potential for sediments to recontaminate following cleanup. SPU and King County are working with businesses in the area to reduce the amount of pollutants currently discharged to the waterway via storm drains and combined sewer overflows (CSOs). The inspection efforts are focusing on areas that have been identified as high priorities for cleanup based on the results of human health and ecological risk assessments. Inspections are comprehensive, covering stormwater pollution prevention, hazardous waste management, and industrial waste disposal issues. Source tracing involves collecting sediment samples from catch basins, inline maintenance holes, and inline sediment trap to characterize the quality of sediment at various locations in the drainage system.

SPU and King County submit progress reports every six months to EPA and Ecology on the source control program (reports submitted in July 2004 and January 2005). The LDW source control program is expected to continue through the next NPDES reporting period. Inspectors and source tracing efforts will move into the Norfolk early action area in August 2005. Following is a brief summary of work completed during this reporting period:

- Inspections in 2004 continued in the Diagonal Ave S CSO/SD basin and expanded into the Slip 4 early action area, as well as the Slip 5/6 drainage basins. Inspectors from SPU, King County Hazardous Waste, and King County Industrial Waste completed 411 inspections (267 full inspections and 144 screening inspections) in the Lower Duwamish Waterway in 2004 and 10 inspections during the first six months of 2005 (9 full and 1

screening inspections). In addition, inspectors conducted 330 and 39 follow-up inspections in 2004 and 2005, respectively, to confirm that corrective actions requested during earlier inspections had been implemented. SPU inspectors were responsible for 235 of the 411 inspections completed in 2004 and the 9 inspections completed as of June 2005.

- In August 2004, inspectors also began working in the areas draining to the East Waterway. Although not part of the Lower Duwamish Waterway site, the East Waterway is undergoing cleanup by the Port of Seattle. SPU and King County are providing source control support to the Port for this effort. Inspectors completed 35 inspections (27 full and 8 screening inspections) in the East Waterway in 2004 and 172 inspections (138 full and 34 screening inspections) during the first six months of 2005.
- In 2004, sediment samples were collected from 36 onsite catch basins, 39 catch basins in streets/roadways, and 10 maintenance holes in storm drains discharging to the Lower Duwamish Waterway. In addition, two rounds of sediment trap samples were collected from the 7 sediment traps installed in the Diagonal Ave S CSO/SD basin.
- As a result of the catch basin sampling, SPU discovered elevated levels of PCBs in street dust and adjacent roadway shoulders in a small area in the South Park neighborhood (Dallas Ave S, 17th Ave S, and S Donovan St). The roadways in this area were in poor condition, leaving PCB-contaminated soil and street dust exposed in the public right-of-way. SPU conducted an interim cleanup in late 2004 to protect public health by containing PCBs present in the right-of-way. Work involved excavating PCB-contaminated soil in the roadway shoulder and replacing with clean gravel, grading and paving the streets, and installing a temporary stormwater collection and treatment system to control runoff from the newly paved streets. Runoff from this approximately 1.8 acre area is currently discharged to the combined sewer system. The treatment plant was removed in April 2005 after testing showed that PCB levels were low enough to meet King County discharge limits; however, runoff continues to be stored and discharged at a controlled rate to the combined sewer.

In June 2005, a total of 790 tons (approximately 525 CY) of PCB-contaminated soil was removed from three adjacent properties, as well as along the west edge of 16th Ave S between Dallas Ave S and S Cloverdale St. Cleanup along 16th Ave S was conducted because PCBs were found in street dust along the edge of the pavement in March 2005 as part of additional site characterization work conducted by SPU. SPU is currently working to develop a cleanup plan for the public right-of-way.

Beth Schmoyer (206) 386-1199, Tanya Treat (206) 615-1636

3.5 STORMWATER POLLUTION PREVENTION

3.5.1 Household Hazardous Waste Program

The Household Hazardous Waste (HHW) Education program is a multi-faceted approach to educating the public, including the under-served community, about the proper use, storage, re-use and disposal of hazardous household products and about the availability of less toxic alternatives. Product stewardship is a growing part of this work as well, including the Take It Back Network for electronics.

Kathy Minsch (206) 615-1441

Green Home Kit Program

This program produces and distributes Green Cleaning Kits and Green Cleaning information primarily in the form of Green Cleaning Recipe Cards. The program also conducts New Parent Workshops that use these kits to help established parent training groups that learn about a broad range of hazardous household chemicals and healthful alternatives to these chemicals. In addition the Green Home Kits have been used as outreach tools at community festivals and by community-based organizations serving recent immigrant and refugee populations. In most cases, recipients of the kits are directed to use them as a means to begin an educational process about hazardous household chemicals that encompasses the more dangerous groups of cleaners. Among the accomplishments for 2004:

- Distributed 2152 Kits;
- Distributed over 10,000 recipe cards.
- More than 50 HHW presentations were done by other agencies (King County DNR & Solid Waste) for teachers, youth, and new parents using green home kits;
- Program costs reduced by \$20K due to users picking up and putting together kits themselves;
- Environmental Coalition of South Seattle (ECOSS) outreach team did 134 presentations for the following language groups: Spanish, Vietnamese, Somali, Amharic and Cantonese speaking communities;
- HHW presentations were conducted with Filipino, Samoan, Khmer, Somali, Chinese, and Vietnamese communities; and
- Tour of South Transfer station provided for ECOSS staff and Samoan and Filipino community members.

Michael Davis (206) 615-1376

The Eco Home

The Eco Home is a collaboration between Seattle Public Utilities, Seattle City Light, Seattle Tilth, the International District Housing Alliance (IDHA), King County Public Health, and King County DNR. The program is designed to educate festival attendees using hands on activities showing what they can do in their home, yard, garden and community to protect the health of their family and the environment and save money. Agency staff and trained community volunteers were on hand to engage the public and answer questions. Among the accomplishments in 2004:

- Eco Home display at two community events: International District Street Fair and White Center Jubilee Days;
- Youth from IDHA's Wilderness and Inner-city Leadership Development (WILD) participated in all parts of display, provided translation, did surveys, etc;
- Community members participating in EJNA did outreach at White Center Jubilee Days and United Africa Day;
- Additional outreach display provided by the U.S. Forestry Department that featured information on recreational activities and salmon conservation. This partnership was made possible by contacts at IDHA;

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- Seattle Public Utilities' Recyclettes provided information on the new recycling program and had information available in English, Chinese, Spanish, Vietnamese, and Cambodian; and
- In addition to continued volunteer partnerships at WC Jubilee Days, the Khmer Community of Seattle/King County provided translation skills and outreach.

Michael Davis (206) 615-1376

3.5.2 Storm Drain Stenciling

The purpose of SPU's Storm Drain Stenciling Program is to educate the general public about pollution prevention and reduce pollution in the storm system. SPU provides storm drain stenciling and oil spill kits for community and business volunteers. Among the accomplishments in 2004 and the first half of 2005:

- Seattle school participants stenciled 1,440 storm drains in Seattle, and
- The general public stenciled 1,670 storm drains.

Carlton Stinson (206) 684-7624

3.5.3 Mutt Mitt Program

This program is designed to keep pet waste out of the drainage system and promote the message that pet waste affects water quality. Eight Mutt Mitt dispensers, each with 200 mutt mitts (plastic bags), have been installed at Delridge Community Center, Piper's Creek Watershed, Seattle Water Front (2), West Lake Union (2), and Mt. Baker Park.

Carlton Stinson (206) 684-7624

3.5.4 Resource Venture

SPU contracts with the Resource Venture, a member of the Greater Seattle Chamber of Commerce, to increase business awareness and compliance with current stormwater codes. The Resource Venture provides free information, education, and technical assistance to help Seattle businesses improve all conservation practices. Their stormwater assistance, provided by ECOSS (The Environmental Coalition of South Seattle), focuses on providing site-specific assistance for businesses needing non-standard approaches to pollution prevention. The Resource Venture and ECOSS reach businesses through newsletters, trade publications, community presentations, workshops and phone and web resources. In 2004 and 2005, additional time and resources were devoted to assisting SPU in the implementation of a Spill Kit incentive pilot program.

Louise Kulzer (206) 733-9162

3.5.5 Hazardous Material Inventory

As a result of the Hazard Communication business process redesign, SPU revitalized its annual Hazmat Inventory in 2005. The new inventory is designed to capture additional information from the SPU users about processes involving the use of priority products (products that pose significant risk to human health and the environment), the product's physical characteristics, and the usage history. The inventory forms the basis for developing employee communications and training on safe use procedures, efficient management of stocks on hand, and for regular upkeep and removal of unused, outdated, or surplus chemicals that otherwise could end up in

the environment . Additionally the information obtained on the priority products will be compiled and analyzed for process and product substitution and toxics reduction opportunities in SPU operations.

Shab Zand (206) 233-5172

3.5.6 Hazardous Material Reduction

In 2005, SPU launched the MSDS/Product Ranking and Toxics Reduction project. The hazardous products compiled in the 2005 inventory will be analyzed and categorized based on hazardous characteristics. Priority Products (products that pose significant risk to human health and the environment) will be targeted for replacement with safer substitutes when feasible. Ultimately, approved product lists will be developed along with purchasing controls to limit future use of toxic products.

Additionally SPU continually facilitates the roundup and exchange of excess hazardous products from SPU shops and facilities. This waste reduction strategy along with improved facility practices and green purchasing continues to yield great savings in disposal costs (these products if not used-up would become hazardous wastes), reduced new product purchase costs, improved facility compliance and decreased regulatory scrutiny. These products are first offered to various City Departments for re-use and later offered to other users through the King County Local Hazardous Waste Management Program's Industrial Materials Exchange (IMEX).

Shab Zand (206) 233-5172

3.5.7 Natural Lawn and Garden Care Campaign/Natural Soil Building

In 2004 and the first half of 2005, the Natural Lawn and Garden Care Campaign continued with distribution of the "Naturals" brochures to nurseries and community events throughout King County. A new brochure, *The Plant List*, provided residents with over 300 suggestions for plants adapted to conditions from sunny and dry to shady and wet. Over 110,000 brochures were distributed to area nurseries, the Northwest Flower & Garden Show, and other event and organizational requests. In 2004 and the first half of 2005, there were over 5,600 pesticide reduction-related questions answered by Hotline staff. Overall, the Hotline answered over 21,000 questions related to environment-friendly yard care. 2,970 people participated in workshops, meetings and speaking engagements on natural yard care during this time period.

SPU continued participating in Northwest Natural Yard Days with other regional agencies. The program continued with a regional focus, encompassing box stores from Bellingham to Olympia plus smaller independent stores in the King County area. The program sold a broad range of environmentally-sound products including electric mulching mowers, push mowers, organic fertilizer, insecticidal soap (alternative to pesticide), hand weeding tools, water timers, soaker hoses, compost and bark mulch. In 2004, the program transitioned to a seasonal format with sales in both Spring and Fall. In the Seattle/King County/Tacoma area, nearly 270,000 products were sold during the spring of 2004 and 2005.

During 2004 and the spring of 2005, the Natural Soil Building Program sold over 5,500 food waste composters and over 2,100 yard waste composters to Seattle residents. SPU co-sponsored a seminar titled "Stormwater: Turning a Potential Problem into an Asset". The seminar filled quickly both years and provided information on soil improvement, swales, rain gardens, cisterns, permeable paving and green roofs to nearly 300 mostly professional attendees.

In 2004 and the first half of 2005, SPU conducted Natural Yard Care Neighborhood outreach in five new neighborhoods. The response was once again very positive. A series of six classes over three evenings was presented in each neighborhood, plus a fall follow-up class was presented to the two 2004 neighborhoods. As part of this effort, 311 residents attended one or more evenings of natural yard care training. Door prizes were awarded, and participants gave very high ratings to all the workshop presenters. Evaluations conducted in Fall 2003 and 2004 indicated a high degree of attitude and behavior change, and a persistence of most of the key behavior changes.

Carl Woestwin (206) 684-4684

3.5.8 Green Gardening Program

Since January 2004, the Green Gardening Program contract has been carried out by Cascadia Consulting Group. The program has been managed by SPU and funded by the Local Hazardous Waste Management Program (LHWMP) since 1993 with the goal of educating King County residents and landscape professionals about alternative pest management strategies in an effort to reduce pesticide use. Among the accomplishments for 2004:

- Reached 500 individuals through 37 public presentations, with two-thirds of the presentations in King County outside of Seattle;
- Created a new interactive public presentation on alternatives to weed and feed products;
- Trained 147 nursery staff through on-site trainings and 67 nursery staff in presentations at Bainbridge Gardens, where the staff of the nursery demonstrated how they had shifted their inventory to far less toxic landscape products;
- Reached 357 landscape professionals through two separate half-day workshops designed to reach two different professional audiences: public groundskeepers and private landscapers;
- Recruited community garden writers to promote the Green Gardening Program. Local newspapers mentioned the program by name eight times, and published twelve articles focusing on green gardening topics;
- Gave a natural yard care presentation to the Khmer Community Center; and
- Measured behavior change for participants of Green Gardening presentations. Approximately two-thirds of the respondents reported that since the presentation they had increased their use of at least one beneficial integrated pest management practice.

During the first half of 2005, the program:

- Reached 549 attendees through public presentations, including lunchtime classes for Boeing workers;
- Piloted a "home garden party" presentation held at an individual's home and featuring a walk-through with problem solving in the host's garden; and
- Presented a food garden pest management workshop for Chinese and Korean gardeners at the Danny Woo Gardens. This presentation was featured in an article on the front page of the Local Section of the Seattle Times.

All aspects of the Green Gardening Program were evaluated with participant surveys. For

instance, 61% of respondents gave ratings of a 4 or a 5 out of 5 for the usefulness of the workshops, 87% rated a 4 or 5 for likeliness to share new information with customers, and 75% gave a 4 or 5 for the effectiveness of the speakers.

Carl Woestwin (206) 684-4684

3.5.9 Pesticide Reduction

Seattle's pesticide reduction efforts are part of the City's Environmental Action Agenda, the City's strategy for protecting environmental quality, promoting environmental justice, and improving quality-of-life in Seattle for current and future generations. The Seattle Environmental Management Program (EMP) was adopted as a methodology for achieving the City's environmental goals within our operations. The EMP contains policies and procedures for moving us toward those goals. The EMP Chemical Use Policy establishes a framework for evaluating potentially hazardous materials and prioritizing products for phase out and replacement with less hazardous alternatives. Pesticides were the first product group addressed under the policy because they are potentially hazardous chemicals intentionally placed directly into the environment.

The two main goals of the Pesticide Reduction Program are (1) to eliminate the use of the most potentially hazardous herbicides and insecticides and (2) to achieve a 30 percent reduction in overall pesticide use. Employee-driven innovations have resulted eliminating use of most Tier 1 insecticides and herbicides and significantly reducing overall pesticide use. Citywide pesticide use was reduced from the annual average baseline (1995-1999) by 16% in 2003 and 28% in 2004¹ with the following notable observations:

- For general City operations (not including city-owned golf courses), pesticide use declined from the 1995-1999 average by 33% in 2003 and by 43% in 2004;
- On golf courses, pesticide use decreased 7% from the 1995-1999 average in 2003 and 21% in 2004. A target was established to achieve a 30% reduction by 2008;
- Reduced pesticide use in non-golf course park maintenance operations by 60% in 2004; and
- Evaluated the pesticide-free park program and recommended that eight parks be added to the program over two years.

The focus of the pesticide reduction program for 2005 continues to be golf course pesticide use. Golf courses pose unique challenges as they are relatively artificial environments and therefore particularly susceptible to disease. Seattle Parks is working to reduce pesticide use while maintaining playability by replacing products with those with lower concentrations of active ingredients, more targeted pesticide applications, and enhanced cultural practices to improve turf health and disease resistance. Early results are promising.

Additional information on Seattle's Pesticide Reduction Program is available at:

<http://seattle.gov/environment/pesticides.htm>

Tracy Morgenstern (206) 386-4595

¹ These numbers represent pesticide use for Seattle City Light, Seattle Public Library, Seattle Parks and Recreation, and the Seattle Center; data for the Seattle Department of Transportation and Seattle Public Utilities were not available.

3.5.10 Pesticide Free Parks

In 2001, Seattle Parks and Recreation and the Office of Sustainability and Environment designated fourteen Seattle park locations as Pesticide-Free Parks (PFPs). These locations have been maintained without the use of pesticides, providing City staff with the opportunity to better understand options for caring for lands with less reliance on pesticides and providing the community the opportunity to enjoy parks managed without pesticides. In 2004, Seattle Parks completed an expansion program plan to provide a greater geographic distribution of Pesticide-free Parks throughout the City. Eight additional Pesticide-free Parks will be added for a total of 22 PFPs citywide. Four PFPs are expected to come online by June 2005, and the remaining four are estimated to come online by June 2006.

Barb Decaro (206) 615-1660

3.6 PUBLIC INVOLVEMENT, EDUCATION, STEWARDSHIP.

Pollution prevention activities conducted by SPU include public involvement, education, and stewardship programs are described below.

3.6.1 Creeks, Drainage, and Wastewater Citizen Advisory Committee

Seattle Public Utilities sponsors several Citizen Advisory Committees. The advisory committee most involved with stormwater-related issues is the Creeks, Drainage and Wastewater Citizen Advisory Committee (CDWAC) which has 14 members that represent different Seattle communities. This committee sets its own work plan and operating procedures with input from staff. Decision-makers within SPU are regularly briefed on committee actions and input, and emphasis is placed department-wide on responding promptly to committee recommendations. The membership of this committee includes citizens with professional backgrounds in the subject area and representatives of relevant stakeholder groups to provide a diversity of viewpoints. In 2004, the committee made recommendations on the following: Comprehensive Drainage Plan, Comprehensive Wastewater Plan, Aquatic Resources & Water Quality Monitoring, Drainage Rates, and Critical Areas Ordinances.

Carlton Stinson (206) 684-7624

3.6.2 Environmental Education Team

The Environmental Education Team works with both public and private partners to provide an integrated program providing a range of environmental messages encompassing solid waste, hazardous waste, recycling, water quality/drainage, and water conservation. SPU supports students through curriculum assistance and field trips that connect students with the environment outside the classroom. Among the Team's accomplishments during 2004 and early 2005:

- Partnered with the Seattle School District to provide integrated environmental programs for 2nd, 4th and 5th grade groups;
- Provided staffing and funds for teacher training to integrate SPU messages in classroom presentation and academic curriculum;
- Provided storm drain stenciling materials and services to Seattle public and private school groups;
- Assisted in providing transportation and funding for naturalist led field trips to local watershed parks to experience hands-on watershed education about water quality

issues; and

- Began Mutt Mitt Program Pilot to reduce pet waste in public spaces. In partnership with Seattle Parks and Recreation and SDOT, SPU purchased and installed six mutt mitt stations to prevent pet waste from getting into sensitive water systems in Seattle. The program is designed to educate the public and help protect water quality by providing plastic bags for citizens to pick up their dog's excrement.

Anthony Matlock (206) 386-9746

3.6.3 Salmon in the Schools

The Salmon in the Schools program gives students hands-on activities and field trips to enhance current environmental curriculum taught by Seattle teachers. Raising salmon in the classroom helps get students become interested and involved in their watershed and provides an opportunity to learn what they can do to protect the environment. Among the accomplishments in 2004:

- Program completed its 14th year;
- 72 Seattle schools participate in the program;
- Program serves 4th and 5th grades in both public and private schools; and
- Students plant over 20,000 salmon fry into local streams.

Carlton Stinson (206) 684-7624

3.6.4 Environmental Grant Funding

The Environmental Grant program provides funding support for community groups or schools to do one-time, short-term projects that protect, educate and involve communities in educating and protecting our natural resources with respect to water quality, solid waste, and litter and graffiti. During 2004, SPU was involved in funding the following projects:

- **Seattle Public Schools, Land & Water Science Units.** Seattle Public Utilities and Seattle Public Schools partnered to provide teacher training, equipment and curriculum materials for students in the 4th and 5th grades. The units are called Land and Water and Micro-worlds. The focus of these units deals with water quality and habitat restoration and preservation. In 2004, the program assisted 68 teachers from 38 schools and served over 1,700 students;
- **Puget Soundkeeper Alliance Lake Union and Portage Bay Watershed Cleanup.** Puget Soundkeeper Alliance planned a waterway to create a 24-page stormwater awareness booklet that focuses on 10 actions citizens can use to make changes in their daily lives that will improve water quality in Lake Union and Portage Bay;
- **Sanislo Elementary School Wetland Improvement Project.** Sanislo Elementary in West Seattle and Explorer West Middle School worked together on a one-acre site located at the headwaters of Puget Creek to rid the area of invasive species of plants that dominate the site to increase the diversity of plants that help create a healthy wetland area for natural filtration;
- **Phosphate-Free Zone in Green Lake Watershed.** Eighth graders at Billings Middle School have taken a leadership role in helping to educate the Green Lake community about the conveyance of phosphate pollution to Green Lake by atmospheric

particulates;

- **Fauntleroy Watershed Education Brochures.** Neighborhood group created brochures with tips about responsible stewardship and information about wildlife, neighborhood contacts, walking info and erosion control. The brochures were given to students and parents;
- **Nathan Hale High School Habitat Restoration Project.** Students restored habitat on a 750 square foot space at the South Fork of Thornton Creek by removing invasive species and protecting the bank from erosion by planting native trees and shrubs;
- **Kenyon Street Neighbors Education to Prevent Pollution.** The Kenyon street neighbors hosted a workshop to educate neighbors about best management practices and water conservation and the careful and limited use of fertilizers and pesticides; and
- **Storm Drain Stenciling Support.** SPU provided community groups and schools supplies to stencil drains around their schools and in communities throughout Seattle with the message "Dump no Waste Drains to Stream". This program educates people about water quality and taking personal responsibility to help keep our lakes and streams clean. Local groups stenciled over 596 storm drains in Piper's Creek, Longfellow Creek and Thornton Creek watersheds in Seattle.

Anthony Matlock (206) 386-9746

3.6.5 Urban Creeks and Watershed Stewardship Team

The goal of leading the Watershed Community Stewardship Team is to expand and strengthen urban creek stewardship in our five major watersheds by leveraging partnerships, coordinating internally and facilitating implementation of watershed plans and programs. Highlights from 2004 and the first six months of 2005 include:

- Partnered with Resource Conservation on Natural Yard Care Neighborhood workshop series of four classes in the Lower Thornton Creek Watershed in 2004 and Piper's and Longfellow Creek watersheds in Spring 2005;
- Negotiated new Scope of Work for Ecology Grant on the Highpoint NDS Outreach and Education grant. Established partnership with SHA for the grant and coordinated the resolution of key issues;
- Staffed Division Director on Restore Our Water strategy (previously Aquatic Ecology Initiative's Community Programs and Incentives Team);
- During Spring 2004, presented 3rd annual training on managing community stewardship projects for WSU Cooperative Extension in King County Watershed Steward Class;
- Represented SPU on WRIA 8 Public Outreach Committee. Assisted in the planning and staging of two Lakeshore Living workshops for 35 Lake Washington homeowners in 2004 and one in 2005;
- Natural Resource Stewardship Network (NRSN) grants awarded to community groups for several Seattle urban creek watersheds;
- Liaison with four watershed councils for presentations and commenting on drafts of CDP, ROW and Aquatic Habitat program; and
- Led team retreat focused on water quality messaging in our programs.

Kathy Minsch (206) 615-1441

Creek Steward Program

The Creek Steward Program provides opportunities to learn about our creek systems and get involved in sustaining Seattle's urban creeks. Through partnerships with Seattle Parks and Recreation (SPR) and other agencies, local community groups, businesses, schools and individuals, the Creek Steward program restores riparian vegetation, maintains existing plantings, monitors creeks and salmon, and educates citizens in best management practices to benefit our urban creeks. Among the 2004 accomplishments:

- Recruited and trained 56 Site Stewards on 50 sites in five watersheds. Site Stewards provide long-term care and maintenance for established sites along Seattle creeks. Tens of yards of invasive ivy and blackberry were composted in place or removed by truck, and over 225 bags of knotweed were removed from riparian areas. In 2004, 999 volunteers contributed 3046 hours in support of Seattle creeks. Since January 2005, 499 volunteers have logged over 1099 hours of volunteer time. Continued work with business and educational volunteer partners including Starbucks, CDM Consulting, and local elementary and high schools;
- Continued Backyard Steward program in 2004. Visited 19 citizen backyards (both streamside and greater watershed). Formulated standards for steward requirements in line with Department of Planning and Development regulations;
- Presented three tours of Meadowbrook Pond to students, organizations and the general public. Held two "Living With Beavers" educational and hands-on workshops;
- Conducted five Naturescaping workshops to teach creek-friendly gardening practices in the Taylor Creek and Piper's Creek watersheds (in partnership with King County and community organizations). 318 attendees learned about Creek Friendly Gardening techniques and salvaged native plants to be used in their new landscapes;
- Provided training in Macroinvertebrate (streambug) Monitoring – volunteers then sampled in Taylor, Longfellow and Fauntleroy Creeks;
- Creek Steward staff enabled citizens to report violations of Environmentally Critical Areas code and stopped actions harmful to the creek on at least seven occasions in 2004; and
- Began stewardship support to residents on the innovative stormwater control swales that comprise the Natural Drainage Systems in Piper's Creek watershed. Held community work party and distributed a homeowner guide for landscape maintenance.

Bob Spencer (206) 684-4163

Longfellow Creek Watershed Project

The Longfellow Creek Watershed Action Plan guides the work of this program. The four major goals are to: (1) improve habitat; (2) improve water quality and stormwater management; (3) increase public education and outreach; and (4) improve and enhance public access. The Plan outlines recommendations and commitments made by cross-jurisdictional partners, including SPU, Parks and other City departments as well as County agencies, community groups and Neighborhood Councils. The Watershed Specialist staffs the Longfellow Creek Watershed Council and collaborates with several teams at SPU (Watershed Community Stewardship, Education, and Environmental Justice) as well as Parks (Environmental Learning Centers) to

meet overlapping objectives. The MOA with Parks outlines additional program description. In 2004:

- Worked with the Longfellow Creek Watershed Council (Stewardship Committee) to award 5 grants totaling \$77,700; Grant funds were used to create and install a Sensory Garden and install 1,810 plants at SW Thistle site;
- Coordinated activities that resulted in 518 volunteer hours contributed by volunteers from Seattle Works and employees from Bon Macys and Nordstrom Rack. Additional service hours also contributed by students from Our Lady of Guadalupe School, Seattle Lutheran HS, Chief Sealth HS, West Seattle HS, Denny Community Learning Center and Outward Bound;
- Coordinated the creation and installation of a Forested Wetland interpretive sign and outdoor classroom benches at SW Thistle Street;
- Attended 13 Longfellow Creek Watershed Council meetings;
- Attended monthly Longfellow Creek Stewardship Committee meetings resulting in the expansion of monthly work party activities to Roxhill, Thistle and SW Brandon sites;
- Coordinated activities for a University of Washington Landscape Architecture student plan for restoration of Brandon site adjacent to newly complete trail segment;
- Distributed 1,000 copies of Longfellow Creek brochure/map highlighting the Watershed Council work, restoration projects and Legacy Trail;
- Coordinated logistics for Watershed education programs for 650 Seattle Public School students (integrated with Land and Water classroom unit);
- Developing auto care outreach program with graduate student, and partnering with Envirostars, two auto repair shop owners, South Seattle Community College Automotive Tech program; and
- Working with Seattle Housing Authority and Highpoint community groups on outreach and education related to the new natural drainage system being installed as part of the redevelopment of Highpoint in the watershed. This work is being done as part of a grant from the Department of Ecology.

Sheryl Shapiro (206) 233-2046

Piper's Creek Watershed Project

The Piper's Creek Watershed Action Plan for the Control of Nonpoint Source Pollution (1990) outlined a series of recommendations, which included providing a Watershed Interpretive Specialist to help develop and coordinate community outreach on watersheds and to improve water quality. A review of the Plan was completed in 2000 that outlined new recommendations to further meet the goals of the Watershed Action Plan. Among the accomplishments in 2004:

- Action Plan Implementation. The annual status report on the Piper's Creek Watershed was produced and distributed in May. Two Watershed Council meetings were convened. Agendas focused on Greenwood dewatering issues (May) and bacteria in Piper's Creek (October);
- Living Green in Piper's Creek. 151 people attended programs on watershed friendly gardening and home remodeling. The *Real People's Gardens Tour* featured 13 watershed-friendly gardens. Tours and outreach of Broadview Green Grid, Carkeek

Cascade and SEAstreet Natural Systems projects included over 210 people in 13 tours. Over 300 people were presented with information (e.g., tours and/or the Take Care Tips) about the sustainable features of the LEEDs Gold Rated Carkeek Environmental Learning Center. Business and Industry Resource Venture Partnership (BIRV) produced a water quality fact sheet for Piper's Creek, distributed as part of an SPU contract for business outreach and source tracing; and

- School Outreach. 605 Students from 22 schools participated in 3 hour-long naturalist programs at Carkeek Park as part of the Seattle School District's 5th Grade science "Land and Water" curriculum.

Events related to the Piper's Creek Watershed in 2004 included:

- Carkeek Park Earth Day. Cooperative with Carkeek Watershed Community Action Project. Approximately 50 youth stenciled 79 drains, distributed information and picked up 100 lbs of trash;
- Carkeek Day. Piper's Creek interactive display and information for community based celebration at Holman Rd shopping center (200 attendees);
- Piper's Creek Annual Salmon Celebration. Over 200 attendees. A pre-program at the Greenlake Library provided stories and activities for over 150 participants; and
- 2004 Piper's Creek Watershed's Greenwood Seafair: The *Greenwoodians* of the Piper's Creek Watershed won 1st prize in the Community Float category. The *Greenwoodians* are Green and they practice Watershed friendly behaviors including pickup after their pets and washing their cars correctly. Estimated parade attendance is 10,000 people.

Beth Miller (206) 684-0877

Taylor Creek and Deadhorse Canyon

Located in Southeast Seattle, Taylor Creek is a small creek that flows from the Skyway District of King County and into Lake Washington at 68th Avenue South. Most of the reach that flows through Seattle proper is within Lakeridge Park and has formed Deadhorse Canyon. Though greatly improved over past years, the area continues to suffer from an infestation of invasive weeds. Volunteers have been trained to recognize invasive weeds and in proper planting techniques for native species. As part of the broader Creek Stewardship Program, the Taylor Creek Stewardship effort provides support to residents concerned with improving the natural habitat of the entire Taylor Creek watershed in general and the Dead Horse Canyon area specifically. Such support includes, but is not limited to, tools and supplies, northwest native plants, volunteer recruitment, refreshments, and logistical support. Among the accomplishments during 2004 and the first half of 2005:

- Supported 16 regularly scheduled monthly work parties (over 1050 volunteer hours);
- Coordinated and supported 6 special work parties (over 1650 volunteer hours);
- Supported High School internship program, which trains students to teach elementary school level basic watershed sciences;
- Removed over 60 cubic yards (conservative estimate) of invasive weeds;
- Planted over 900 plants, including 200 trees. All plants were northwest natives suitable for riparian habitats. Future plantings will include a broader diversification of species;

2004 Update Report

- Removed 1500 pounds of illegal dumping;
- Continued to maintain the closure of “volunteer trails” to reduce erosion; and
- Supported the efforts of the Urban Nature Project to develop a habitat conservation plan for the Canyon. Plan includes an inventory of existing biota including beneficial native and undesirable invasive species, an assessment of habitat improvements done to date and recommendations for future efforts. The full report will be available with the next update.

Tom Gannon (206) 684-8565, Bob Spencer (206) 684-4163

Thornton Creek Watershed Program

The Thornton Creek Watershed Management Committee, now the Thornton Creek Watershed Oversight Council, meets approximately 10 times a year to advise the two city partners (Seattle and Shoreline) on implementation of a Five-Year Action Agenda culled from the draft 2001 Thornton Creek Watershed Action Plan. SPU staffs the committee and facilitates and oversees implementation of priority programs and projects. The latter includes management of the Homewaters Project contract, creek steward program activities in the Thornton Creek watershed, coordination with other city agencies, responding to community issues and implementation of special projects. Among the accomplishments during 2004 and the first half of 2005:

- The resolution to officially establish the Thornton Creek Watershed Oversight Council was adopted by Seattle city council in Fall 2004. A combined slate of new and continuing members were officially appointed Spring 2005;
- The watershed council met ten times in 2004 and five times in 2005 through June. Subcommittees form and meet as needed on specific policy or implementation issues;
- Developed draft watershed report on accomplishments from July 2003 through December 2004 in implementing the Action Agenda; and
- Negotiated continuation of MOA in 2004 and 2005 which provides funding for the Homewaters Project to conduct outreach and education programs in the Thornton Creek Watershed. For 2004 and the first six months of 2005, Homewaters Project published five newsletter issues, developed and printed a new Thornton Creek map and brochure, developed an innovative map based curriculum for middle and high school teachers and school groups, led three “Long Walk” field trips, developed and provided three community presentations, added images to the watershed digital library, and sponsored a green mapping workshop and forum for students.

Kathy Minsch (206) 615-1441

3.6.6 Stormwater Outreach and Education

Stormwater outreach and education develops and publishes educational materials on what impacts people can have on stormwater runoff and what people can do to protect water quality. Conducted the following activities in 2004:

- Created new Bert the Salmon cartoon – “Be in Tune with the Environment” - on keeping cars tuned to prevent pollution of our waterways. Cartoon aired eight weeks. Co-funded surveys at two community festivals with Channel 11, which showed the message was understood;

- Wrote two Curb Waste and Conserve articles: (1) “Keeping our Creeks, Lakes and Sound Clean” in the summer issue, related to nonpoint source pollution and storm drains and (2) an article on leaves, storm drains and flooding in the fall issue;
- Funded Puget Soundkeeper Alliance to expand new watershed stewardship pledge book to include whole city, not just Lake Union;
- Partnered with Parks to fund Puget Soundkeeper Alliance water quality signs project around Lake Union;
- Cosponsor for and helped plan two annual Lake Union Cleanup events with Puget Soundkeeper Alliance with messages about water pollution;
- Distributed 200 flyers and 1000 brochures on pet waste management to 50 Seattle businesses including animal hospitals, veterinary clinics, pet stores, and dog groomers; and
- Distributed 100 door hangers on how to prevent debris clogging of catch basins to businesses and residents located near storm drains the flood frequently.

Kathy Minsch (206) 615-1441

3.7 ILLICIT DISCHARGES

In addition to the programs described below, investigation of illicit discharges and improper disposal of materials to surface water are also incorporated into a number of programs described elsewhere in this report, including Water Quality Complaints (Section 3.4.2), Business Inspection Program (Section 3.4.3) and TV inspections performed on storm sewers (See 3.8 Operations & Maintenance of Drainage System).

3.7.1 SPU Spill Coordinator/Response Program

SPU implemented a Spill Coordinator Program in 1998 to respond to hazardous material spills occurring in the Seattle service area. The role of the Spill Coordinator is to lead SPU response activities including: evaluating hazardous substance spills, deciding how best to mitigate and clean up the spill, mobilizing and committing SPU resources, and overseeing the activities of a spill response contractor, if needed. A Spill Coordinator is available 24-hours a day, including weekends, on a rotating 1-week duty schedule. At present, the network consists of twelve Spill Coordinators trained to the Hazardous Materials Emergency Response Technician level. The spill response experience from 1998-2004 is shown in Table 4.

Table 4. Spill Response

	1998-99	2000	2001	2002	2003	2004
# of Spills	44	42	70	75	69	106
SSC response	20	28	60	57	52	80
Non-duty hour	N/A	12	9	30	28	37

Part of the reason for the increase from 2003 to 2004 is enhanced attention to spill cleanup and reporting at the transfer stations. Spill Coordinators also continue to respond to a growing number of spills reported to the OCC by private citizens. In addition, other City departments are pro-actively calling SPU when spills impact or threaten our drainage infrastructure. Petroleum-based products continue to be the largest category of spilled materials.

John Labadie (206) 684-8311

3.7.2 Illegal Dumping

SPU has developed a number of programs to respond to litter and illegal dumping activities in the city and to ensure the efficient collection of litter in public places. The objectives of these programs are to reduce or prevent litter activities, enforce city ordinances, and facilitate community cleanup. An effective illegal dumping program reduces pollution being washed from our streets and alleys into the storm drains and receiving waters. Among the accomplishments in 2004:

- Resolved over 3,000 cases, of which more than 2,700 were reported over the Illegal Dumping Hotline (206-684-7587);
- Provided for the pickup, collection and removal of 2,370,000 pounds¹ of illegally dumped materials on City streets, roads, and public areas. This includes illegally dumped materials along state highways in the city as well as in publicly owned open space; and
- Crews cleaned up approximately 6,413 illegal dumpsites from the community in 2004.

Over the first six months of 2005, SPU has resolved over 2,500 cases of which more than 2,100 were reported over the Hotline.

Alex Tonel (206) 684-4170

3.8 OPERATIONS & MAINTENANCE OF DRAINAGE SYSTEM

SPU Drainage and Wastewater Operations Division is responsible for drainage system maintenance. Table 5 and Table 6 list the different activity accomplishments.

Table 5. 2004 Quarterly Totals

Main Line Cleaning	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total lineal feet
Hydrocut	0	637	1,545	1,265	3,447
Machine Rodding	0	132	668	0	800
Jet Cleaning	277	479	193	875	1,824

Main Line TV Inspect	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total lineal feet
TV Line	4,421	1,073	1,049	1,627	8,170

¹ The amount of illegally dumped materials may not include litter detail, which is not measured the same as illegally dumped materials. Depending on crew and vehicle availability, clean up may involve more or less frequent litter detail versus illegal dumping as a measure of tonnage.

Table 6. 2004 Drainage Maintenance

Activity	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Mechanical Clean-Catch basin/Sand box	1,406	2,141	3,130	2,630	9,307
Manual Clean Inlets*	2,475	1,401	1,512	1,473	6,861
Power Rodding (lineal feet)	3,596	2,135	3,454	6,200	15,385
Inspect Catch Basin/Sand Box	10,669	8,008	7,663	6,718	33,058
Repair/Replace Drain Structure	78	78	22	34	212
Maintain Ditches (lineal feet)	17,601	41,999	102,459	33,204	195,263
Closed circuit TV Inlet/Outlet Pipes (lineal feet)	182	41	91	195	509
Clean Settling Basins/Ponds	8	5	4	8	25
Jet Cleaning (lineal feet)	8,771	6,390	4,471	5,753	25,385
Clean Bridge Drains	405	971	291	171	1,838
Hydrocut (lineal feet)	839	0	515	0	1,354

* Note that tracking of inlet cleaning has changed since 2003. Cleaning of inlets is now included in the catch basin inspection process and is no longer tracked separately. Thus, there were more inlets cleaned in 2004 than represented in the table.

Pat Gorham (206) 386-9730

3.9 OPERATIONS AND MAINTENANCE OF ROADWAYS

Seattle Department of Transportation (SDOT) Street Maintenance Division has a staff of approximately 65 field and management personnel involved in street sweeping and de-icing. The City has seven sweepers that follow a schedule (weather permitting) of cleaning public streets and roads. Industrial and commercial areas are regularly swept on a rotating basis. Bike paths are cleaned approximately once a month. In addition, roadways known to receive a significant number of leaves receive repeated visits during autumn. Street cleaning crews also respond to emergency calls, for example oil spills on the roadway that are typically cleaned up with absorbent pads, brooms or sphagnum. During freezing weather, the City uses sand and anti-icing and deicing products to aid traffic. After winter storms, street sweepers pick up any remaining sand. In 2004, approximately 30,926 curb miles of streets were swept. Litter control is the responsibility of the SPU Community Services Division, which coordinates a number of volunteer programs to help keep the City's roadways clean, such as Adopt-a-Street, Neighborhood Cleanup, and Spring Clean. Table 7 shows the 2004 SDOT Street Maintenance accomplishments and expenditures for drainage-related work.

Table 7. Selected 2004 expenditures for Street Maintenance

Activity	Accomplishments (Units)	2004 Expenditures
Mechanical sweeping	30,926 Curb Miles	\$937,022
Street flushing	246 Work Miles	\$18,361
Alley flushing	5,521 Alley Blocks	\$78,599
Snow & ice response	2,921 Labor Hours	\$204,692

SDOT street maintenance workers have been trained in erosion and sediment control and best practices for roadway maintenance (Regional Road Maintenance Program). Through SDOT's Environmental Management System, they are challenged to identify environmental aspects and impacts of their work.

Jim Dare (206) 684-5319

3.9.1 ESA Regional Roads Maintenance Program

In 2004, the City of Seattle developed a city-wide erosion and sediment control training curricula. Several classes were developed and delivered throughout the year. These courses were offered to management, planners, designers, field crews and inspectors. The City also consolidated elements of the Regional Roads Maintenance Program (RRMP) as well as the new training program and a Best Management Practices selection process into a single program called the Stormwater Cooperative. A guidance manual was completed in December 2004.

Sandy Gurkewitz (206) 684-8574

3.9.2 Street Sweeping Pilot Study

In 2004, the City of Seattle began the planning stages of a year long street sweeping pilot that is scheduled to begin in March 2006. The pilot's goal is to test the effectiveness of street sweeping at removing non-point source storm water pollutants and to determine how frequent sweeping effects debris accumulation within catch basins. Over the past year the City has undertaken and completed several tasks to insure the success of this pilot:

- Formation of an intradepartmental team comprised of urban scientists, operations staff, analysts, planners and financial staff;
- Visited and talked to other jurisdictions and observed their sweeping operations;
- Completed a "sweep off" where the effectiveness of ten pieces of sweeping equipment from four manufacturers were tested;
- Received a consultant report summarizing the results of the "sweep off";
- Developed criteria for selecting the pilot basin, physically evaluated several pilot basins and narrowed the field down to three basins;
- Brought in a leading street sweeping consultant to discuss our approach to the pilot and to tour the top three basins;
- Developed the framework for the water quality and catch basin monitoring, design, implementation and analysis work; and
- Began discussions with parking management and public relations staff to develop a parking management aspect of the pilot.

Keith Ward (206) 615-0734

3.10 MUNICIPAL TRAINING

3.10.1 Drainage Maintenance Crew Training – Standard Operating Procedures

In 2001, SPU initiated a program designed to address routine maintenance and repair work on

drainage infrastructures located within environmentally sensitive areas. Such areas include both fish and non-fish bearing streams, plus ditches that have the potential to impact creeks. Standard Operating Procedures (SOPs) have been developed as part of this maintenance program describing appropriate Best Management Practices (BMPs) to be included as part of the maintenance activity to protect the creek in which work was being conducted and the resources downstream of the work area. The focus of each SOP was to avoid adversely impacting water quality, primarily by containing loose sediment and containing turbidity to inside the isolated work area. The SOPs were developed to provide guidance and standards to drainage maintenance crews that conduct routine maintenance to the drainage infrastructure within environmentally sensitive areas on a regular basis. In 2003, the program received full SEPA review and was permitted under the Washington Hydraulic Code. The program addresses the following activities:

- *Sediment Removal.* The removal of excess sediment from the drainage system including catchbasins, culverts and deposition areas within creeks and ditches that are creating conveyance problems;
- *Creek Structure Maintenance.* Re-anchoring, repair, removal, or replacement of creek structures (rock or boulder weirs, logs, root wads, El-wood, boulders) placed in the creek as part of a restoration project;
- *Ditch Cleaning/Reshaping.* Cleaning/reshaping of ditches that have potential to impact a creek;
- *Culvert Repair.* Repair of culverts located within creeks or ditches with potential to impact a creek;
- *Minor Bank Stabilization.* Stabilization of stream and in-line pond banks and the banks of ditches that have potential to impact a creek. This work only includes minor stabilization that can be considered maintenance to prevent bank sloughing or continued erosion;
- *Hydrocutting.* Hydrocutting of roots, grease and miscellaneous debris within pipes located within a sensitive area or ditch with potential to impact a creek in order to provide proper conveyance;
- *Trash And Debris Management.* Removal of trash and organic debris from creeks and from ditches that have potential to influence a creek; and
- *On-Line Pond Maintenance.* General maintenance work within a retention/detention pond that is hydraulically connected to a creek. Work could include, but is not restricted to, sediment removal, repair or replacement of natural structures (such as LWD), repair of existing culverts, debris and trash removal, or vegetation establishment and maintenance.

Crews conducting this kind of work receive ongoing training in these SOPs.

In 2004 the Drainage and Wastewater Division implemented a training program developed by the Seattle Stormwater Coop that addresses all soil disturbing activities wherever they occur. This program utilizes a comprehensive list of known practices that minimize soil disturbance and protect the surrounding area from runoff. The program incorporates a checklist to determine where the potential for air and water quality violations exist and how to mitigate them before the project is implemented. This program covers all activities that can potentially contaminate air or water bodies within the Drainage and Wastewater Division. Staff are now fully engaged in environmental protection for all projects with the potential for adversely

affecting the environment. During 2005, there will be periodic reviews and training for existing and new staff regarding environmental compliance.

Gary Lockwood (206) 684-7750

3.11 INFORMATION & DATA COLLECTION, MANAGEMENT & ANALYSIS

This section highlights some of the activities conducted during this reporting period the support decision making, project design, and programmatic modifications. It includes not only on-going data collection and analysis efforts, but also summarizes some of the underlying tools that support data and information management.

3.11.1 Information Support Programs

Precipitation Monitoring

Currently, there are 17 rainfall-monitoring stations located throughout the city. No major upgrades, expenditures, or maintenance were performed in 2004. Table 8 provides average monthly rainfall accumulation. The average annual rainfall accumulation in Seattle in 2004 was 28.09 inches.

Table 8. Average Monthly Accumulations (inches) in 2004

Jan	5.56	Jul	0.31
Feb	2.31	Aug	2.92
Mar	1.90	Sep	1.99
Apr	0.62	Oct	2.21
May	2.30	Nov	2.59
Jun	0.68	Dec	4.70

Hai Bach (206) 684-5139

Surface Water Quality Databases

SPU staff maintain several Microsoft Access databases, including surface water quality complaint investigations, business inspections, Lower Duwamish superfund inspections, drainage system inspections, and monitoring and sampling data.

Ellen Stewart (206) 615-0023

GIS Support

The history of Seattle's Geographic Information System (GIS) dates back to the mid-1980s. Evolving from a small installation in the former Seattle Engineering Department, the City's GIS was originally built to improve the way the City manages and operates its utility infrastructure. Seattle's GIS capabilities are now firmly entrenched within the daily business functions of most City Departments. Available GIS data can be combined to produce a wide variety of maps and/or to perform analysis. The system is used to inform decision makers and planners, help deliver services to the public, dispatch Police and Fire personnel, and manage City real estate. The City of Seattle's GIS base map, referred to as the Central Geographic DataBase (CGDB), consists of nine GIS databases. These nine base layers are the foundation for the City's geographic systems environment and are the shared layers to which all other thematic GIS layers are spatially registered. The CGDB is composed of the survey control layer, the Platted

Subdivision layer (lots, plots and plats commonly referred to as the Legal layer), Parcels, the Street Network database, Discrete Address Points, Common Place Names, Buildings, Topography and the Orthophoto layer. This set of base layers is accurate to +/- 1 to 2 feet and was constructed using a combination of existing coordinate information, Global Positioning Satellite (GPS) surveys, photogrammetric densification, and calculations based on plat information and other survey data. The result is one of the most spatially accurate sets of GIS base layers in the country.

SPU's operational Drainage & Wastewater GIS layer contains over four million records representing all sewer and storm mainlines and service connections. It was built over a period of three years from two main information sources: the Side Sewer Cards and the original CAD-based Truck Set maps. Today's system is maintained by a SPU staff of three and produces a variety of hard copy custom and standard map sets (e.g., 200-scale maps, Truck Set maps). City and Utility staff have direct access to the data through easy-to-use custom interfaces.

The primary focus for the Drainage and Wastewater (DWW) GIS continues to be data accuracy in support of SPU Asset Management. In 2003 and 2004, the majority of our labor resources were devoted to synchronizing the DWW GIS with SPU's Work Management System (then Hansen/IMS). With that effort complete, GIS and SPU Operations staff are now involved in migrating the DWW Work Management System to Maximo. Other efforts of significant impact to the data have been:

- missing data values that have had a negative impact on the DWW Risk Model are in the process of being corrected;
- outfall data has been updated based on field surveys;
- GIS data layers have been created to represent flow monitoring and rain gage equipment; and
- data representing CSO infrastructure has been thoroughly reviewed and updated.

Another effort getting underway in 2005 is a rigorous effort to analyze the DWW GIS data for remaining errors and inconsistencies and complete all of the necessary corrections. This effort will also address the issue of catch basins, ditches and culverts being represented in multiple GIS layers by collapsing these layers into a single source (the primary DWW GIS data base).

Harvey Arnone (206) 233-0028

Basin & Creek GIS Delineation

Beginning in the fall of 2001, SPU began updating the creek watershed boundaries in GIS for Thornton, Taylor, Fauntleroy, Longfellow, Schmitz and Piper's creeks using new and revised ditch, culvert and topographical information. Within each of these creek watersheds, SPU has also been delineating outfall sub-basins using GIS mainline data, topography, and ditch and culvert data. The watershed boundary and sub-catchment boundary delineations are 100% complete. In 2002, SPU began also annotating smaller creek basin boundaries and started delineating drainage basin boundaries for major outfalls discharging into the City's receiving water bodies. These delineations are 95% complete.

Scott Reese (206) 733-9172

3.11.2 Receiving Waters

Urban Creeks Watershed Analysis

The Urban Creeks Watershed Analysis is a study assessing the physical and biological conditions of five salmon-bearing watersheds in the City of Seattle – Thornton, Piper's, Longfellow, Taylor and Fauntleroy creeks. The purpose of the study is to provide a technical data catalog to inform decision-makers in planning projects and programs that affect fish and habitat in Seattle's creeks. The study assesses fish use in each system including existing and potential distribution, passage for migration, and changes in the annual distribution of spawning activity and of smolt (juvenile) production. Physical data include habitat quantity and quality, channel conditions, riparian composition, sub-basin delineation, surficial geology, and land use. Field inventories are completed, and the data are actively managed in Microsoft Access databases. The data are further represented spatially using the City of Seattle's Geographic Information System (GIS). An analysis of physical data is currently underway to help develop an understanding of how watershed processes affect the availability and condition of habitat in each system. The results of this assessment will be captured in individual technical reports on Channel Condition, In-stream Habitat Condition, Riparian Condition, and Fish Use, which will provide guidance for managing Seattle's aquatic resources. The data are also currently being applied to an integrated "State of the Waters" report which provides information on baseline conditions in Seattle's aquatic systems. In addition, data from the Urban Creeks Watershed Analysis are applied as appropriate to the planning and design of individual in-stream projects.

Katherine Lynch (206) 233-5194

Aquatic Community Assessment Program

SPU continues to use regionally developed sampling protocol, converting the raw data into the regionally accepted Benthic Index of Biotic Integrity (B-IBI.) In 2004, eight samples were collected from Longfellow, Taylor, Fauntleroy, and Schmitz Creeks. Benthic macro-invertebrates were collected at these sites by a combination of volunteers and SPU staff. SPU will continue to collect three replicate samples per site, with three square feet of creek bed sampled per replicate. In 2004, SPU teamed with King County to participate in King County's Normative Flow project, which will involve using SPU's B-IBI scores to look at the relationship between flows and biological integrity in Thornton Creek. Two reports on the B-IBI data have been written for the volunteers who collected the data, one for the 2003 data and one for the 2004 data. A Quality Assurance Project Plan (QAPP) was written for this monitoring in 2005.

Laura Reed (206) 615-0551

Storm Event Sampling

A storm event is defined as a storm that lasts for a minimum of four hours and contributes at least 0.1 inches of rain with an antecedent dry period (less than 0.01 inches of rain) of at least eight hours. Storm event samples (flow-weighted composite samples) are collected at the following four locations:

Piper's Creek basin:

Venema Creek at the mouth

Piper's Creek at footbridge downstream of Venema Creek

Piper's Creek above orchard

Longfellow Creek at Yancy Street

For the period January 2004 through December 2004, storm samples were collected at the three Piper's Creek stations on the following dates:

February 16, 2004
May 7, 2004
December 9, 2004

During the same period, samples were collected during the following three storm events at the Longfellow Creek station:

February 16, 2004
August 25, 2004
December 9, 2004

Analytical reports from these and previous storm sampling events are retained in an electronic database and hard copy files maintained by SPU staff.

Mike Hinson (206) 733-9134

Coho Pre-spawn Mortality Investigation

Over the last few years, SPU has been working with other resource agencies to investigate the cause of the high levels of coho salmon pre-spawn mortality that have been observed in urban creeks in the Puget Sound area. In 2004, SPU, WDFW, and volunteers carried out daily spawning surveys in Longfellow Creek and Des Moines Creek (in unincorporated King County) to support coho mortality studies conducted by the National Oceanic and Atmospheric Administration (NOAA). If symptomatic or freshly dead coho were found during the surveys, NOAA collected tissue samples for analysis. SPU also continues to support weekly coho spawning surveys by Washington Trout in other Seattle urban creeks during October through December.

Laura Reed (206) 615-0551

3.11.3 CIP Support & Effectiveness Monitoring

Hydrologic and Water Quality Monitoring of Natural Systems

SPU has been actively implementing and conducting performance evaluations of City-designed natural drainage systems (NDS) projects. These projects include 1) SEA Street (NW Seattle; completed in 2001), 2) Broadview Green Grid (NW Seattle; majority complete by 2004), 3) Viewlands Swale (NW Seattle; completed 1998), 4) Highpoint Housing Redevelopment (SW Seattle; under construction), and 5) Venema NDS (NW Seattle, in design). These projects represent retrofits to the existing drainage infrastructure, and monitoring objectives focus on flow control and/or water quality. Monitoring (water quality and/or flow) has been implemented for all the projects listed above. Specifics on the Broadview, Highpoint, Pinehurst, and Venema projects are listed below.

Broadview Green Grid. The Broadview Green Grid (BGG) is designed to provide both flow control (infiltration and detention) and water quality treatment (infiltration with some biofiltration). In 2003 SPU began evaluating the performance of the BGG. Baseline monitoring downstream of the project (at NW 107th St) was discontinued in 2004 at the start of project construction. Construction was completed in late 2004. Additional flow monitors were installed at three new

stations to measure flow through the system. Post-construction flow monitoring began once construction was completed. Post-construction water quality monitoring will begin after vegetation is well established.

Highpoint. Pre-construction monitoring at Highpoint was discontinued in 2004 at the start of site construction. This Seattle Housing Authority project will convert a 1940's era housing project to a mixed-use area that will contain 1,600 housing units and community facilities such as a public library and medical/dental clinic. The project is being constructed in two phases. Site demolition was completed in 2003, and construction of Phase 1 began in 2004. The project design incorporates a number of innovative stormwater management technologies including natural drainage system designs and porous pavement, along with a standard wet pond system. A sampling plan is currently being developed to evaluate the performance of some of the stormwater management techniques that were constructed in Phase 1 to provide information to aid in the design of Phase 2. In addition, SPU is designing a monitoring program (to be implemented after all construction is complete) to evaluate the performance of other stormwater management techniques as well as the overall NDS design.

Venema NDS. The Venema NDS is being designed to provide both flow control (infiltration and detention) and water quality treatment (infiltration with some biofiltration). Pre-construction flow and water quality monitoring downstream of the proposed project (NW 120th St & 4th Ave NW) continued in 2004 with support from the University of Washington. Samples were analyzed for standard stormwater pollutants (total suspended solids, fecal coliform bacteria, total and dissolved metals, and NWTPH-Dx). UW students collected samples during 3 storm events in 2004 and 7 events during the first six months of 2005. Baseline monitoring will continue in 2005-2006. The project is currently in the design phase.

Ingrid Wertz (206) 386-0015

CIP Performance Evaluation

During 2004 and the first half of 2005, SPU continued a long-range monitoring program for SPU creek restoration projects to determine whether or not they are meeting their design goals (the type of monitoring conducted at each project site is driven by the goals of the project.) High priority in-stream construction projects are located in Piper's Creek, Thornton Creek, Longfellow Creek, Fauntleroy Creek and Taylor Creek. The following types of structures are monitored: wetlands, detention ponds, log weirs, rock weirs, an "el-wood" structure, off-channel pools, bank protection, gravel addition, pool addition, fish passage weirs, lunkers, root wads, and riparian replanting. The purpose of CIP effectiveness monitoring is to provide information on the level of improvement or protection afforded a water body as a result of the constructed system or BMP. This information will refine stormwater management decisions and advance the benefits gained by strategically investing in the most effective activities and projects.

The following table (Table 9) shows the distribution of new sites requiring monitoring through time. Each site is monitored intensively during the summer months for the first three years. All of the sites are monitored periodically during the rest of the year.

Table 9. Number of CIP Performance Sites

Year	No. of sites requiring monitoring
1999	8
2000	5
2001	3
2002	4
2003	4
2004	3
2005	2
Total	29

Two technical reports, summarizing the information gained from three years of monitoring for the sites constructed in 2000 was completed in the spring of 2004.

Laura Reed (206) 615-0551

BMP Effectiveness Monitoring

Stormfilter Testing

The City of Seattle, along with Washington State Department of Transportation (WSDOT) and the City of Tacoma, is evaluating the performance of a Stormfilter system manufactured by Stormwater Management, Inc. The system, installed at the WSDOT I-5 test facility, is set up to conduct side by side testing of different filter media. The Stormfilter system is being evaluated for its ability to remove typical stormwater pollutants (e.g., total suspended solids, total phosphorus, and metals) and organic compounds such as phthalates and petroleum hydrocarbons. Testing began in October 2003. During the first year, a perlite/zeolite mix and a perlite/zeolite/granular activated carbon mix were tested. In 2004, the perlite/zeolite mix was dropped and replaced with a 100 percent granular activated carbon media. To date, the target of collecting samples during 15 storm events has been met. The City of Tacoma is providing funding to continue testing in 2005-2006. A few additional samples may be collected at the Stormfilter system, and one season of testing will be conducted on an Aquafilter unit in 2005-2006.

Beth Schmoyer (206) 386-1199

Swirl Concentrator Testing

SPU has completed tests to evaluate the performance of Downstream Defender, Vortechs, and Stormceptor swirl concentrator stormwater treatment technologies under a grant from Ecology. Field sampling at the Downstream Defender and Vortechs sites began in 2001, and sampling of the Stormceptor unit began in January 2004. The number of storm events sampled at each of the test sites is shown in Table 10.

Table 10. Number of Storm Events Sampled at Swirl Concentrators

Test site	Samples
Downstream Defender	20
Vortechs	20
Stormceptor	8

Samples were analyzed for total suspended solids, total phosphorus, soluble reactive

phosphorus, NWTPH-Dx, and metals (copper, lead, and zinc). The final project report was submitted to Ecology in March 2005.

Beth Schmoyer (206) 386-1199

3.11.4 ESA Information

Urban Blueprint for Habitat Protection and Restoration

Seattle's urban environment represents highly impacted habitats, requiring an adaptive management strategy to determine the best and most scientifically valuable actions to take. In June 2001, the City of Seattle completed a draft *Urban Blueprint for Habitat Protection and Restoration* (Urban Blueprint), and the final Urban Blueprint was issued in December 2003, following extensive public and peer review. The Urban Blueprint analyzes chinook salmon behavior within five extant aquatic environments within the city and identifies important habitat attributes to protect and restore. Future supplemental science reports will be issued as findings result from our continued research program.

Based upon the findings in the Urban Blueprint and continuing research, the City of Seattle is continuing to focus on the following actions:

Protecting the Puget Sound Shoreline. Protecting and restoring gravel beaches, eel grass beds and other shallow areas that provide plentiful food, refuge and spawning areas for other fish that chinook eat.

Restoring Shallow Habitat along Lake Washington, Lake Union and the Ship Canal. Providing juvenile salmon with shallow shoreline areas, free of bulkheads and other structures, where they can feed and escape bass and other predators.

Improving Shallow and Side-channel Habitats in the Industrial Duwamish Waterway. Restoring tidal flats, wetlands, side channels and other areas where juveniles can feed and rest while growing and adjusting to saltwater.

Making Migration through the Ballard Locks Safer. Developing ways for adult and juvenile salmon to get past the Ballard Locks quickly and unharmed.

Updating Local Regulations. Among regulations under review are Seattle's critical area ordinance, storm water code, and shoreline master plan. The City's Comprehensive Plan will also incorporate, where appropriate, findings from the Urban Blueprint and additional salmon habitat research findings.

In 2004, the Mayor announced a new initiative, Restore our Waters, that uses the above information and continues to build on it through continuing research. The main focus of the initiative is to coordinate city capital investments across departments to improve aquatic environments utilizing current scientific research on those environments and science criteria, along with stakeholder review.

The *Urban Blueprint for Habitat Protection and Restoration* report is available at:

<http://www.ci.seattle.wa.us/salmon/blueprintdoc.htm>

Martin Baker (206) 684-5984

3.12 CAPITAL IMPROVEMENT PROGRAMS

In 2004, SPU constructed several Capital Improvement Program (CIP) projects that included water quality elements. Some of the principal projects are listed below.

Darla Inglis (206) 233-7160

3.12.1 Natural Systems

Seattle Public Utilities has developed a "Natural Systems" approach to managing stormwater in those basins whose drainage systems are based on ditches and culverts. This approach uses swales, infiltration, and landscaping techniques to reduce stormwater runoff, lower pollutant levels and, in many instances, improve general neighborhood quality.

Broadview Green Grid Project

The Broadview Green Grid project constructed natural infrastructure to manage stormwater flow from an approximately 32-acre sub-basin of the Piper's Creek Watershed. At the time of construction, the project was Seattle Public Utilities' most ambitious Natural Drainage System project to date, involving 15 city blocks. The project benefits Piper's Creek by reducing the occurrence of large, fast flows of water that erode the creek channel, damaging habitat and transporting pollutants common to the urbanized, upper watershed areas. The project's natural infrastructure features swales, cascades, ponds, amended soils, increased vegetation and reduced impervious areas. These features serve to slow the stormwater down and give maximum opportunity for infiltration, giving pollutants time to settle out and helping to sustain creek flows and reduce water temperatures. SPU partnered with Seattle Department of Transportation (SDOT) to provide neighborhood-scale improvements that integrate landscaping, traffic calming, and a sidewalk on each north-south street into the Natural Drainage System design. Construction, which began in August of 2003, was completed in September 2004. The project is in its first of three years of plant establishment and water quality and quantity monitoring. The project includes a "Cascade" system for 107th Street, from 4th to Phinney Avenues, and SEA Street-style improvements along 2nd and 1st Avenues NW and along Palatine and Phinney Avenues N, between 107th and 110th Streets.

James Johnson (206) 684-5829

High Point Project – A Natural Drainage Systems Approach

SPU is partnering with Seattle Housing Authority (SHA) to incorporate natural drainage systems in the High Point mixed income redevelopment in West Seattle. Over 120 acres, High Point is located in the Longfellow Creek watershed and makes up nearly 10% of the watershed. SHA's redevelopment project will replace the existing High Point development with new streets, new utilities, and 1600 units of housing. The High Point Natural Drainage System Plan integrates over 11,000 linear feet of vegetated and grassy swales that are modified from the SEA Streets pilot to fit into a traditional curb-and-gutter street. Each swale will manage the runoff from the adjacent street and block of housing. In addition porous pavement sidewalks and up to three porous pavement streets (first residential street application in the Northwest) will reduce the overall impervious surface of the redevelopment. Finally, design guidelines for the residential properties will include impervious surface reduction incentives and downspout dispersion techniques. The performance of the High Point Natural Drainage System Plan has been predicted based on a block-scale HSPF model. Model results indicate that the plan combined with the pond will meet Seattle's Stormwater Code for peak flow control as well as match the peak and duration for the 2-year pre-developed pasture condition.

Construction for Phase I has begun. As of August 2005, one block of housing and surrounding swales has been completed. The porous pavement street and multiple porous pavement sidewalks have been installed. Preliminary block-scale monitoring is expected this wet season to modify the design in phase two as needed. SPU staff is working with the residents to develop an educational and stewardship program with DOE grant funds.

Miranda Maupin (206) 386-9133

Pinehurst Green Grid Project

The Pinehurst Green Grid project is constructing natural infrastructure to manage stormwater flow from an approximately 49-acre sub-basin of the Thornton Creek Watershed. The project includes drainage improvements on 12 city blocks. The project benefits Thornton Creek by reducing the occurrence of large, fast flows of water that erode the creek channel, damaging habitat and transporting pollutants common to the urbanized, upper watershed areas. The project's natural infrastructure features swales, ponds, amended soils, increased vegetation and reduced impervious areas. These features serve to slow the stormwater down and give maximum opportunity for infiltration, giving pollutants time to settle out and helping to sustain creek flows and reduce water temperatures. SPU partnered with Seattle Department of Transportation (SDOT) to provide neighborhood-scale improvements that integrate landscaping, traffic calming, and a sidewalk or walkway on most of the project blocks.

Construction began in August of 2005 and will be completed in June 2006. The project includes swales, street, sidewalk, and landscaping improvements on 19th Avenue NE between NE 117th and 115th Streets, 20 and 23rd Avenues NE between 117th and 113th Streets, and NE 113th St. between 20th and 23rd Avenues NE. It also includes minor ditch regrading on the south side of NE 117th St. between 16th Ave. NE and 23rd Ave. NE and at the intersection of 25th Avenue NE and NE 113th Street.

Keith Ward (206) 615-0734

3.12.2 Thornton Creek Water Quality Channel

The purpose of this project is to use natural drainage system technology to provide water quality treatment in a highly urbanized area of the South Branch of Thornton Creek. Located at the headwaters of the South Branch of Thornton Creek, this site offers the last available opportunity to provide water quality treatment to this 670-acre drainage basin before stormwater reaches the creek. The project design diverts stormwater from the drainage pipe under NE 100th Street to a series of surface swales landscaped with amended soil and native plants to help clean, infiltrate and slow the stormwater before it reaches the creek. The channel will have water flowing in dry weather, as well as cleanse stormwater from the frequent storms. The existing storm drain pipe will stay in place to carry high storm flows when the channel cannot handle all the stormwater volume. The project design and construction will be coordinated with a new mixed-use development adjacent to the site and provide 2.7 acres of valuable open space for the Northgate community.

SPU has purchased the property. SPU is beginning permitting discussions and plans to begin negotiating an agreement with DOE regarding a loan award for the construction budget.

Miranda Maupin (206) 386-9133

3.12.3 Urban Creeks – Urban Creeks Program

The Urban Creeks Program (previously known as the Urban Creeks Legacy Program) was initiated in 1999 to provide a holistic approach to managing stormwater drainage and improving habitat in Seattle's creeks. Working side-by-side with dedicated citizens, Seattle Public Utilities (SPU) achieved significant progress toward our program goals, which include:

- Improving creek drainage and water quality systems;
- Improving natural creek habitat for fish and other wildlife;
- Enhancing creek health through stewardship and education; and
- Celebrating our creeks and the citizens who care for them.

Among the accomplishments during 2004:

Thornton Creek Watershed. SPU purchased 3.2 acres of property near Northgate Mall near the headwaters of Thornton Creek's south branch for the Thornton Creek Water Quality Channel Project. SPU continues plant establishment and monitoring near the three detention ponds and restored creek channel at Jackson Park Golf Course. SPU continued the second phase of restoration for Thornton Creek Park 6, a 6.5-acre natural area near the headwaters of the south branch. SPU also partnered in the restoration of a small section of creek flowing through Little Brook Park. Much of Little Brook flows through pipes and unimproved channels behind apartment buildings. This project helps create community pride and offers a visual reminder that urban creeks can be beautiful places that support wildlife.

Longfellow Creek Watershed. SPU successfully completed the plant establishment period for previously built creek restoration projects. Earlier projects, including Yancy St and Delridge projects, are functioning as intended.

Piper's Creek Watershed. SPU has developed a concept plan to build natural drainage systems in the Venema Creek drainage basin. The proposed project will benefit Venema and Piper's creeks by reducing the amount of flow and pollutants associated with urban runoff. SPU has also initiated design of a fish passage project to address a barrier formed by a sewer line crossing.

Taylor Creek Watershed. Designs to modify fish barriers under Rainier Ave S are well underway. SPU plans to construct this project in 2006.

Fauntleroy Creek Watershed. In 2004, SPU added large woody debris and boulders to nearly one mile of habitat in publicly owned sections of Fauntleroy Creek. This project is functioning as designed and reduces erosion, slows sediment transport and increases instream habitat.

Mapes Creek. SPU is working with the Army Corps of Engineers to restore the mouth of Mapes Creek. The project is in the reconnaissance/concept stage. If approved for Army COE funding, the project will install a new dedicated pipe for creek water, daylight the lowest section of creek, and create a creek mouth/delta. The primary purpose of the project is to improve habitat to benefit juvenile chinook.

Green Seattle Partnership. SPU approved a six-year, \$900,000 program to restore streamside vegetation. This project works in city-owned forests adjacent to creeks. The program will remove invasive plants and plant native trees and shrubs, especially conifers. The program

works in partnership with Seattle Parks Department, Cascade Land Conservancy and volunteers. SPU sponsored restoration began in early 2005.

Chris Woelfel (206) 684-7599

3.12.4 Other Water Quality Projects

Jackson Park Detention

Three detention ponds with a total storage volume of 25 acre-feet were constructed adjacent to the north branch of Thornton Creek to reduce downstream flooding and erosion problems. To improve fish and wildlife habitat, approximately 2,300 feet of the creek channel was enhanced with large woody debris, rock and ponds. Native vegetation was planted and fish passage barriers removed. Approximately 2.5 acres of riparian wetland was created and enhanced with native vegetation. Design and restoration of golf course features were successfully coordinated with the Jackson Park Golf Course Master Plan to maintain playability, enhance the aesthetic appeal of the golf course, and increase efficiency of the irrigation system. This project was completed in 2003. Monitoring activities to fulfill permit requirements have been carried out since then. A total of 12 shallow groundwater monitoring wells were installed in May 2004 to monitor the wetland soil hydrology. The first annual monitoring report was submitted to Corps of Engineers on June 30, 2005.

Lilin Li (206) 684-7610

4. OTHER PERMIT REPORTING REQUIREMENTS

4.1 LEGAL AUTHORITY

Adequate legal authority to control discharges to and from Seattle's storm drainage systems has been established. In 2000, revisions were made to the City's Stormwater, Grading and Drainage Control Code (Seattle Municipal Code 22.800 – 22.808). In August 2001, Ecology issued revised guidance in its Stormwater Management Manual for Western Washington. In early 2002, the City began a comprehensive comparison of its current set of Stormwater requirements to Ecology's newly revised guidance. In 2004 staff continued to evaluate and perform technical analysis required for upcoming code revisions.

4.2 IMPLEMENTING STORMWATER PROGRAM COMPONENTS

All program components have been implemented and are proceeding in accordance with the City's Stormwater Management Program (SWMP), as approved by Ecology on July 24, 1997.

4.3 KNOWN CHANGES IN WATER QUALITY

Based on the City's data, there were no known significant changes in the water quality of the City's receiving water bodies since the last update.

4.4 CONTROL OF INDUSTRIAL DISCHARGES INTO MS4s

Seattle's Stormwater, Grading and Drainage Control Code (SMC 22.800 – 22.808) prohibits most non-stormwater discharges from being introduced into the City's municipal storm sewer system, including harmful discharges from industrial activities. Seattle's Side Sewer Code (SMC 22.16.300) also prohibits discharging certain substances into the storm drain system.

Additionally, as part of the City's Stormwater Pollution Prevention and Complaint Investigation Programs, Surface Water Quality Investigators conduct investigation when there is evidence of stormwater contamination originating from industrial discharges.

4.5 CHANGES IN PERMIT COVERAGE AREA

There were no changes in permit coverage area in 2004, and none are anticipated in 2005.

4.6 EXPENDITURES FOR STORMWATER PROGRAM

In July 1999, two years after Ecology approved Seattle's Stormwater Management Program, Seattle implemented a new financial management program called Summit. The primary driver behind the Summit Project was the year 2000 problem, which necessitated replacing the previous financial management program (Seattle Financial Management System, or SFMS). Transitioning from SFMS to Summit required developing an entirely new set of organizational, accounting and activity cost codes. In comparison to the data available when Seattle prepared its 1997 SWMP, the coding structure in Summit allows for a much more detailed accounting of budgeted and actual costs incurred. However, in many cases, specific stormwater program costs remain blended with other stormwater programs costs, making an accurate categorical breakdown difficult. This, coupled with organizational changes within SPU and other Seattle Departments since the 1997 SWMP was drafted, means that estimating stormwater program expenditures is both an objective and subjective exercise.

Table 11 provides a rough approximation of the actual overall stormwater management budget. Many City Departments other than SPU and SDOT are involved in programs that could arguably be included in these estimates. A good example would be the joint effort between the Department of Parks and Recreation and Office of Sustainability and the Environment reducing the use of pesticides in City parks. However, in keeping with the methodology used in previous reports, the estimates below are based primarily on SPU and SDOT expenditures. In many cases, owing to the internal organization of SPU, many general management and support functions are jointly funded by drainage, drinking water, wastewater and solid waste funds. In these cases, an assumed fraction of the total costs (typically 25% - 30%) was allocated to stormwater-related programs. It is not intended that these estimates serve as a modification of budget estimates made in previous reports. Instead, these estimates should be viewed as a refinement of the estimate provided in the past, but still a macro-scale analysis of stormwater program operating costs.

Table 11. Overall Stormwater Management Program Budget (Actual Expenditures)

Program	2004 Actual
Drainage O&M	\$ 2,857,000
Street O&M	\$ 1,239,000
Pollution Prevention Programs	\$ 685,000
Public Education Programs	\$ 625,000
Regulatory Development & Enforcement	\$ 264,000
Monitoring Program	\$ 235,000
Other Stormwater Program Costs	\$ 2,981,000
Overall Stormwater Program Budget	\$ 8,886,000

Drainage O&M: Includes SPU Field Operations Branch budgets for drainage inspection, drainage cleaning, and drainage repair, and an estimated portion of the overall branch support costs. Also included are expenses related to the spot drainage program conducted by SPU.

Street O&M: Includes SDOT budgets for mechanical street sweeping, street flushing, alley flushing, and snow/ice response. Not included in the above table are budgets for litter pick-up and illegal dumping.

Pollution Prevention Programs: Includes a variety of programs designed to reduce pollutants at their sources, primarily involving activities conducted by SPU's Community Services Division.

Public Involvement, Education & Stewardship Programs: Includes SPU's water quality and urban creek efforts such as the Salmon in the Schools program, Urban Creeks and Watershed Stewardship Team, and Stormwater Outreach and Education programs.

Regulatory Development & Enforcement: Includes estimated SPU costs for water quality complaint investigations, and business inspections. It also includes the work begun in 2002 to compare Seattle's existing codes and technical standards to Ecology's 2001 Manual guidance.

Monitoring Program: Includes expenditures for surface water quality monitoring.

Other Stormwater Program Costs: Includes estimated proportions of general program management, WRIA Planning, and other support and planning costs. They do not include ESA programs.

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4.7 REVISIONS TO FISCAL ANALYSIS

In accordance with Section S9 of Seattle's NPDES Municipal Stormwater permit, a permit modification is required if there is a greater than 20-percent difference between the *projected* annual budget value contained in the City's SWMP (Table 9.7 in the 1997 SWMP) and the actual budget *adopted* by the City Council for that year. The projected annual budgets contained in Seattle's 1997 SWMP ended with fiscal year of 2000. For comparison purposes, the projected figure for 2000 was \$5,885,474.

5. CLOSING COMMENTS

Seattle's urban landscape differs from many surrounding communities in that *new development* is quite rare. Additionally, Seattle has a very low rate of *redevelopment*, where an urban property undergoes change but retains its urban land use. In fact, Seattle's rate of redevelopment is less than one percent per year. Furthermore, of these redevelopment projects, only a fraction of them are large enough to trigger regulations requiring stormwater treatment and/or flow control facilities. This means that while development regulations play a role in reducing adverse impacts of stormwater runoff, progress toward improving the quality of Seattle's urban must include:

- A suite of stormwater programs aimed at reducing pollutants at or near their sources;
- An on-going maintenance and operations program designed to keep our infrastructure operating properly; and
- A municipal capital improvement program based on placing the appropriate technologies at targeted locations.

Looking ahead, we are committed to better understanding how best to utilize the above techniques of urban stormwater management. Seattle, with its fully built urbanized environment, is in a distinctive position to implement and evaluate new and unique stormwater management strategies. In some areas of the City, for example where the drainage system is primarily ditches and culverts, an increasing emphasis is being placed on targeted retrofits using a natural system design approach. In other areas of the City, where more formalized curb and gutter drain systems are present, a set of programs focusing on infrastructure maintenance and pollution prevention actions may be the most cost-effective approach for improving water quality. Over time we will continue to adjust and enhance our efforts as our knowledge increases and the state-of-the-practice improves.

The City of Seattle has been involved in managing stormwater runoff since the late 1800s, when the first drainage systems were constructed in response to typhoid and diphtheria epidemics and recurring damage caused by flooding. Stormwater management has evolved since those early days and the City has expanded the level of service beyond flood control and human health risks, embracing actions that aim to improve overall surface water quality and enhance aquatic habitats. We remain committed to meeting the challenges of managing stormwater in our urban environment today and into the future.

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APPENDICES

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Stormwater Management Program	Program Manager
Aquatic Community Assessment Program	Laura Reed (206) 615-0551
Basin & Creek GIS Delineation	Scott Reese (206) 733-9172
BMP Effectiveness Monitoring	Beth Schmoyer (206) 386-1199
Broadview Green Grid Project	James Johnson (206) 684-5829
Business Inspection Program	Ellen Stewart (206) 615-0023
Capital Improvement Programs	Darla Inglis (206) 233-7160
CIP Support & Effectiveness Monitoring	Ingrid Wertz (206) 386-0015
Creeks, Drainage, and Wastewater Citizen Advisory Committee	Carlton Stinson (206) 684-7624
Coho Pre-spawn Mortality Investigation	Laura Reed (206) 615-0551
Comprehensive Drainage Plan Update	Darla Inglis (206) 233-7160
Coordination among NPDES Municipal Stormwater Permittees	Darla Inglis (206) 233-7160
Creek Steward Program	Bob Spencer (206) 684-4163
Densmore Drainage Basin	Gary Schimek (206) 615-0519, Ingrid Wertz (206) 386-0015
Drainage Maintenance Crew Training – Standard Operating Procedures	Gary Lockwood (206) 684-7750
Drainage Plans and Permit Approval	Ken Watanabe (206) 233-7912
Drainage System Inspection Program	Ellen Stewart (206) 615-0023, Louise Kulzer (206) 733-9162
Environmental Education Team	Anthony Matlock (206) 386-9746
Environmental Grant Funding	Anthony Matlock (206) 386-9746
ESA Regional Roads Maintenance Program	Sandy Gurkewitz (206) 684-8574
ESA Team	Martin Baker (206) 684-5984
GIS Support	Harvey Arnone (206) 233-0028
Green Gardening Program	Carl Woestwin (206) 684-4684
Green Home Kit Program	Michael Davis (206) 615-1376
Hazardous Material Inventory	Shab Zand (206) 233-5172
Hazardous Material Reduction	Shab Zand (206) 233-5172
High Point Project – A Natural Drainage Systems Approach	Miranda Maupin (206) 386-9133
Household Hazardous Waste Program	Kathy Minsch (206) 615-1441
Hydrologic and Water Quality Monitoring of Natural Systems	Ingrid Wertz (206) 386-0015
Illegal Dumping	Alex Tonel (206) 684-4170
Interagency Resource for Achieving Cooperation	Ellen Stewart (206) 615-0023
Jackson Park Detention	Lilin Li (206) 684-7610
Lake Union Action Team	Darla Inglis (206) 233-7160
Local Hazardous Waste Management Program	Kathy Minsch (206) 615-1441
Longfellow Creek Watershed Project	Sheryl Shapiro (206) 233-2046
Lower Duwamish River Sediment Cleanup and Restoration	Martin Baker (206) 684-5984

Appendix A - Stormwater Management Program Managers (continued)

Stormwater Management Program	Program Manager
Lower Duwamish Waterway Source Control Program	Beth Schmoyer (206) 386-1199, Tanya Treat (206) 615-1636
Mutt Mitt Program	Carlton Stinson (206) 684-7624
Natural Lawn and Garden Care Campaign/Natural Soil Building	Carl Woestwin (206) 684-4684
Norfolk Drainage Basin	Gary Schimek (206) 615-0519, Beth Schmoyer (206) 386-1199
Operations & Maintenance of Drainage System	Pat Gorham (206) 386-9730
Operations and Maintenance of Roadways	Jim Dare (206) 684-5319
Pesticide Free Parks	Barb Decaro (206) 615-1660
Pesticide Reduction	Tracy Morgenstern (206) 386-4595
Pinehurst Green Grid Project	Keith Ward (206) 615-0734
Piper's Creek Watershed Project	Beth Miller (206) 684-0877
Precipitation Monitoring	Hai Bach (206) 684-5139
Pollution Prevention	Louise Kulzer (206) 733-9162
Resource Venture	Louise Kulzer (206) 733-9162
Restore Our Waters Strategy	John Taylor (206) 733-9183
Salmon in the Schools	Carlton Stinson (206) 684-7624
South Park Drainage Basin	Gary Schimek (206) 615-0519, Beth Schmoyer (206) 386-1199
SPU Environmental Compliance Audit Programs	John Labadie (206) 684-8311
SPU Spill Coordinator/Response Program	John Labadie (206) 684-8311
Storm Drain Stenciling	Carlton Stinson (206) 684-7624
Storm Event Sampling	Mike Hinson (206) 733-9134
Stormfilter Testing	Beth Schmoyer (206) 386-1199
Stormwater Outreach and Education	Kathy Minsch (206) 615-1441
Stormwater, Grading and Drainage Control Code and Directors' Rules	Robert Chandler (206) 386-4576
Street Sweeping Pilot Study	Keith Ward (206) 615-0734
Surface Water Planning Unit	Denise Andrews (206) 684-4601
Surface Water Quality Database	Ellen Stewart (206) 615-0023
Taylor Creek and Deadhorse Canyon	Tom Gannon (206) 684-8565, Bob Spencer (206) 684-4163
Thornton Creek Drainage Basin	Gary Schimek (206) 615-0519
Thornton Creek Water Quality Channel	Miranda Maupin (206) 386-9133
University of Washington Center for Water and Watershed Studies	Darla Inglis (206) 233-7160
Urban Blueprint for Habitat Protection and Restoration	Martin Baker (206) 684-5984
Urban Creeks – Urban Creeks	Chris Woelfel (206) 684-7599
Urban Creeks and Watershed Stewardship Team	Kathy Minsch (206) 615-1441
Water Quality Complaints	Ellen Stewart (206) 615-0023
Watershed Forums	Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078

Appendix A - Stormwater Management Program Managers (continued)

<u>Stormwater Management Program</u>	<u>Program Manager</u>
Watershed Resource Inventory Area (WRIA) Coordination	Sarah McKearnan, WRIA 8 (206) 615-0567; Judith Noble, WRIA 9 (206) 684-8078; Scott Powell, WRIA 7 (206) 386-4582; Ed Connor, WRIAs 3&4 (206) 615-1128

APPENDIX B – PERMIT REPORTING REQUIREMENTS CROSS-REFERENCE

The table below cross-references the reporting requirements contained in the 1995 NPDES Municipal Stormwater Permit with the appropriate sections contained in this report.

Permit Reporting Requirement	Req't No.	Cross-referenced Section in this Report
Status of implementing the components of the stormwater management program.	S10.B.1	3.1 - Comprehensive Stormwater Planning (p. 7) 3.3 - Regulations & Technical Standards (p. 16) 3.7 - Illicit Discharges (p. 35) 3.8 - Operations & Maintenance of Drainage System (p. 36) 3.9 - Operations and Maintenance of Roadways (p. 37) 3.10 - Municipal Training (p. 38) 3.11 - Information & Data Collection, Management & Analysis (p. 40) 3.12 - Capital Improvement Programs (p. 47) 4.1 - Legal Authority (p. 50)
Changes in permit coverage area:	S10.B.2	4.5 - Changes in Permit Coverage Area (p. 51)
Expenditures for stormwater program	S10.B.3	4.6 - Expenditures for Stormwater Program (p.51)
Revisions to fiscal analysis	S10.B.4	4.7 - Revisions to Fiscal Analysis (p. 52)
Summary and analysis of cumulative monitoring data (4th Year Report only)	S10.B.5	Not applicable
Summary of compliance activities, inspections, and education activities	S10.B.6	3.4 - Permitting, Inspections & Enforcement (p. 16) 3.4.7 - Lower Duwamish Waterway Source Control Program(p. 21) 3.6 - Public Involvement, Education, Stewardship (p. 28)
Known changes in water quality	S10.B.7	4.3 - Known Changes in Water Quality (p. 50)
Status of watershed-wide coordination activities	S10.B.8	3.2 - Partnerships (p. 11)